NEW

Home Computing WEEKLY

An Argus Specialist Publication

March 22-28, 1983 No. 3 35p

MAIL ORDER MICRODRIVES SHOCK

Mail order customers who bought Spectrums last year will have the first chance to buy Sinclair's Microdrives.

Making the surprise announcement, managing director Nigel Searle said: "Some of those people had to wait 16 or 18 weeks... I'd like to think that they will realise that we do value our existing customers."

Each Microdrive will cost £40 and would have a capacity of more than 100K and an access time of better than three seconds. Up to eight could be linked together.

As usual, he would not talk about the recording medium inside the Microdrives, but he did say they would be interchangeable and about the price of 5¼in floppy discs. These retail at about £2 each.

Price of the essential interface unit — which also enables Spectrums to use most popular printers — will be £30.

Mr Searle said: "I think at the time we originally announced the Microdrives last April we expected it to take something like six months to get into production and it will have taken almost twice that time — perhaps even longer.

"Last April the mechanical design was substantially complete, but we had underestimated the difficulties of doing the electronic design.

"We had some production difficulties with the Spectrum and a lot of effort... was put into those problems. It was August last year before it got the full-time attention of the people who are working on it.

"We have made improvements in the performance we expected it to have. It will be more reliable than we hoped to achieve. It's been one of those projects when the engineers would like to go on and on and making more improvements, but a line has to be drawn.

"Now it's a question of waiting for the semi-conductor manufacturers to supply.

"It's not possible at this

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Two-page Sinclair report

US Scene

Pages of news

Reviews of programs for BBC, VIC-20

Programs to type in for: Spectrum, ZX81, VIC-20, PET

Articles on Oric, TI-99/4A

Micro makers in reverse

A new computer is due to make its debut in three months — from a company which is reversing into micro making.

Add-on makers Basicare Micro Systems are to call their machine the Shuttle, because it accepts their modules just like the American spacecraft.

One of the joint managing directors, Peter Choi, is now in Hong Kong with the blueprints getting quotations for making the metallic grey casings.

Benny Leung, the other MD, said: "We had the idea about a year ago. Instead of going into it like other firms we are doing it the opposite way — the peripherals first, for the ZX81 and the Spectrum.

"Then we introduce the keyboard and the CPU so the whole thing is complete, not the other way round."

The two men — who have been friends for 20 years — are thinking of £150-£200 for the model with a Spectrum-like keyboard and £250-£300 for typewriter-style keys.

The Shuttle would be about the size of a slim portable typewriter with a recess to accept

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IN BRIEF

Turn your Spectrum into a word processor, says a company which has brought out a Centronics-type interface module.

It plugs into the back of the computer and, via a ribbon cable, into dot matrix or daisy wheel printers.

The interface, called ZX LPRINT, costs £41.40, cable £12.08.

EuroElectronics, Zlin House, Oakfield Street, Cheltenham, Glos GL50 2UJ

• • •

Commodore plans to make 700,00 computers a year at its new £20m factory in Corby, Northants.

By the end of the year, says the company, 300 people will be employed there assembling VIC-20s and Commodore 64s for the UK with the surplus being exported.

Commodore Business Machines (UK), 675 Ajax Avenue, Trading Estate, Slough, Berks SL1 4BG

• • •

David Patterson, head of software company Silversoft, has discovered a new hobby — gliding.

David, who said: "I've always wanted to fly", took the plunge a few weeks ago at a gliding club near his home in Wiltshire. He enjoyed it so much that he decided to go back the next weekend.

He said: "One day, I plan to arrive at an exhibition by glider".

Let us know

If you are in the home computer business, please keep us in touch with what your company is doing. News items and review samples of your products — software and hardware — should be sent to: Paul Liptrot, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE. Phone 01-437 1002.

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Continued from Front Cover

stage to say when we will be in production, but it's a lot closer than it was."

The cartridges would initially only be available from Sinclair, but it would be possible for software houses to sell programs on them.

A first batch of letters with order forms would go out to 5,000 mail order Spectrum buyers, followed by the rest of the 100,000 and it would be a few months before the orders were filled.

"That will give us an idea how many other Spectrum owners want them," he said. "It's quite impossible with any new product of any complexity to start producing in volume overnight.

"Some of these people had to wait 16 or 18 weeks so I can't think what more we can do than offer them the first Microdrives.

"If we have it in our power to make the new customer happy rather than the person who first bought from us I know who I would choose.

"You will be able to buy them in Smiths as soon as the demand has been satisfied from our mail order customers.

"We are going to control the availability so that those people will get the opportunity to buy one in the same order as they bought the Spectrum from us.

"I think initially the Microdrive is going to make possible applications which are still inconvenient. Typically this will be spreadsheets and database management systems. It will encourage people to write programs of that sort."

And on Sinclair's past delays he said: "It makes me absolutely determined not to have that happen again. Therefore, we are not going to make any estimates or fix any dates."

Sinclair Research, 25 Willis Road, Cambridge CB1 2AQ

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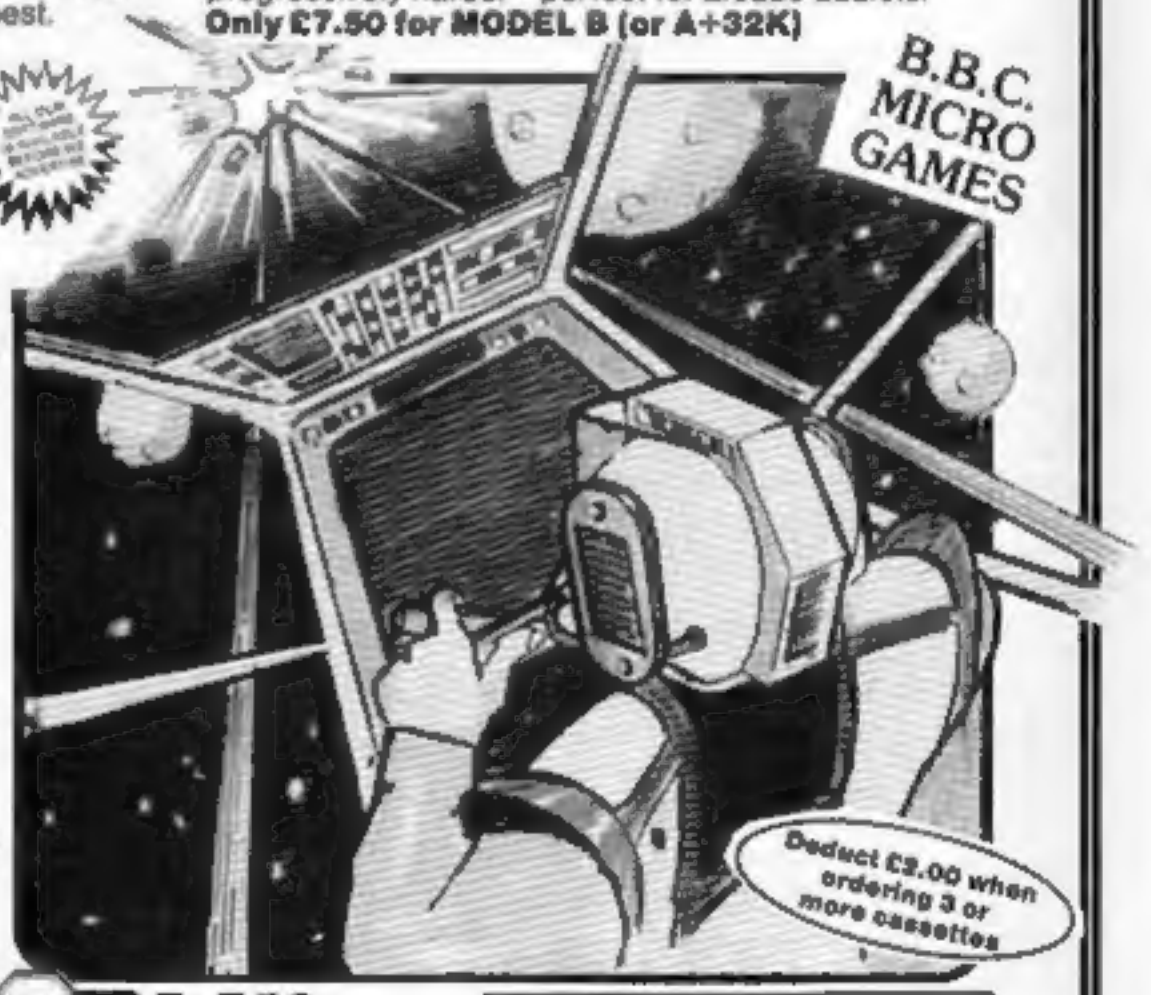

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Continued from Front Cover

Benny Leung

two Basicare modules side by side. Others can be stacked on top.

It would include a 16-bit processor, colour, 16K of RAM, a Microsoft-like BASIC, real sound, the interface from basicare's Persona module and a memory mapping device.

Although the cases would be made in Hong Kong, the computer would be assembled in the UK and a professional marketing company would be brought in.

Mr Leung, 35, whose Fulham-based company has six staff, said: "We hope to show the prototype publicly in June with the first models on sale by the end of the year.

"We reckon that just to launch it will cost something like £50,000 and we are seeking backing from finance houses.

"Initially it will be our present customers who buy it. Then we hope it will be all the serious computer users. Most of them will be using the ZX81 at present. We want them to bypass the Spectrum."

Mr Choi, 34, has designed the new micro and it is Mr Leung who takes care of the day-to-day running of Basicare. Both came from Hong Kong 10 years ago and set up their company in February last year to produce add-on modules.

Mr Leung said: "How big do I think we'll get? Our ambition is quite high.

"We would like to be something like Sinclair Research. We think that this could be a new breakthrough in micro technology — a stackable system that can be tailor-made

Basicare Micro Systems, 5 Dryden Court, London SE11 4NH

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- **Programs should, if possible, be computer printed (use a new ribbon) or sent on cassette. Check carefully that they are bug-free. Include details of what your program does and how, hints on conversion and explain the routines you've used.**
- **Reviewers of software, add-ons and hardware need to have a good knowledge of computers. In your application as a reviewer please give your occupation or training and, if under 21, your age. Don't forget to name your computer and any expansion.**

Keep a copy of your submissions and include an SAE if you want them returned. Label everything clearly and give a daytime and home phone number if you can.

Paul Liptrot, Home Computing Weekly, 145 Charing Cross Road, London WC2H

Libraries take the profits—not the risks

Software libraries need to be controlled or they will kill off the market for programs on cassette. And that will hit not only software houses like ourselves, but the customer too.

We import a lot of our software from America — as well as writing our own — and convert it from the Tandy Colour Computer to run on the Dragon.

We pay 1.50 dollars royalty on a cassette which will retail at £7 and two dollars on a cartridge which is priced at about £20 because they are harder to produce and cartridges are more expensive.

Our commitment is to sell as many as we can or our suppliers would lose interest in supplying the UK. If cassettes are being ripped off no-one's going to invest the money.

Already all our own products are on cartridges because it is better protection. If someone is going to rip off a cartridge it is going to be a dealer because he must have blank cartridges and the equipment.

There is no doubt that libraries have taken multiple copies of a single tape and rented them out for about £1.50 a fortnight. But if they were licensed, how would you control the royalties at, say, 50p per hiring? The administration costs would be too high.

It could kill the cassette market. We may even have to drop the tapes entirely.

One difficulty at present is that many of the software libraries are one-man businesses. They would have to be large and responsible enough to be vetted to make it possible for us to supply software. We would have to guarantee to ourselves that what they told us was the number that they had hired.

You would have to put up the cost of the hiring to £2-£3 to take into account that some people will copy them. It would mean that the vast majority of people would be penalised.

The average life of a game at present is around three months. After that it will have been ripped off to the extent that it's not worthwhile any longer.

One chap came back with a tape he had bought from us and said it would not fit his cassette recorder and he wanted a refund. In my opinion he had taken a copy.

The software libraries take no risks with new products, they are just jumping on the bandwagon. It is very difficult to close them down. With video film copiers their equipment can be seized. Software libraries need very little equipment.

I am very worried about the whole business.

Ted Oprychal
Managing director, Compusense Ltd.

- What makes you angry — or delighted — about the micro market, hardware or software? We welcome contributions for this weekly column. Send them to Opinion, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE. Please include your occupation and your interest in computing.

Fair on the move

The London Computer Fair, run annually by the Association of London Computer Clubs, is moving to the Central Hall, Westminster, due to lack of space at its usual home at North London Polytechnic.

The fourth fair, running from April 14 to 16, includes stands run by 10 London clubs, the first public presentation of Micronet — the home micro network — and new products from several exhibitors.

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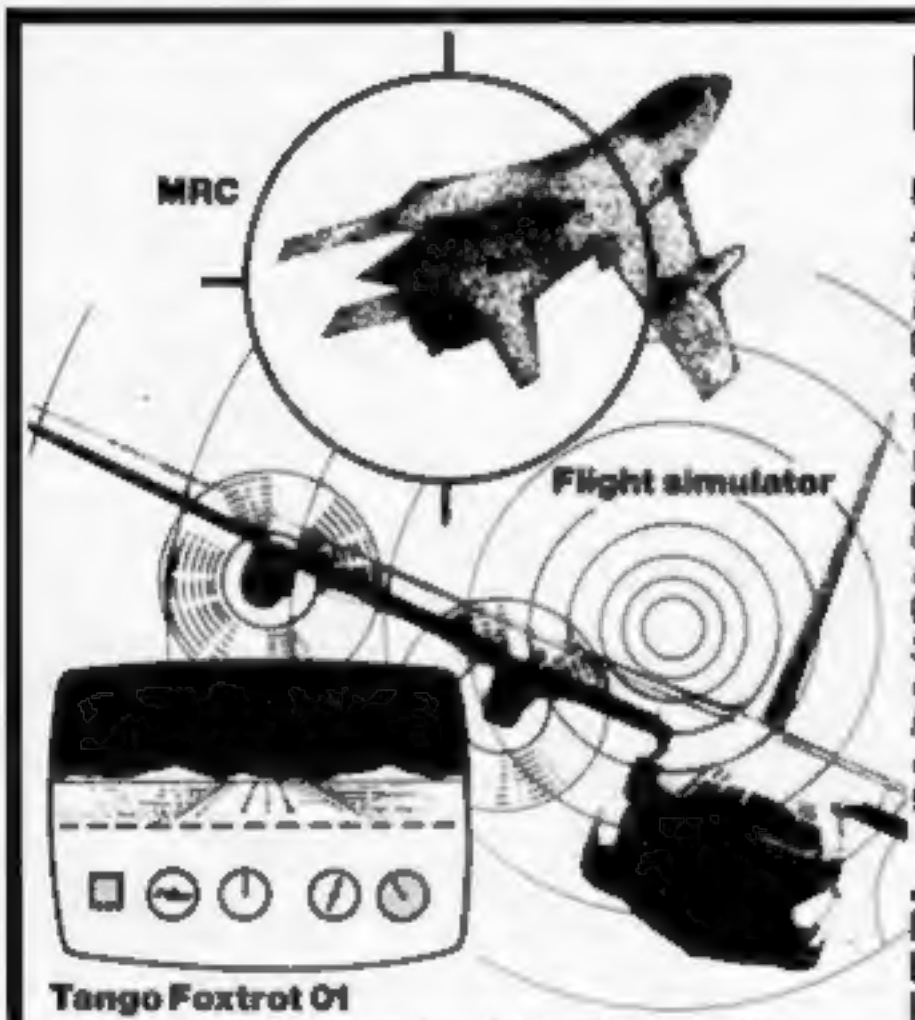

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HCW3

Spectrum power supplies: how we discovered the danger

Sinclair Research has opened its £¾m new HQ. Paul Liptrot went there and talked to the bosses

What exactly went wrong with 28,000 Spectrum power supplies — setting off a massive recall — was revealed by Sinclair managing director Nigel Searle.

He said: "There is a printed circuit board inside the power supply and the tracks which carry the mains voltage are closer than they should be to those which carry the output to the outgoing tracks.

"It could leap over, if you get humidity or dust inside and a huge spike in the mains — four kilovolts. But you must be holding the metal tip that goes into the computer."

In this country spikes in the mains of that magnitude were very rare.

He said: "We have had two reports from people reporting what they claimed to be an electric shock from our power supplies.

"We have asked them to return them immediately and we will examine them. It's entirely possible that they involved static electricity.

"They both involved children and it could be it was mis-described to their parents. We have had no reports of anybody being badly injured.

"Since we caught this within a matter of three to four weeks of when we sent them out I believe there are probably not too many in the hands of customers."

Mr Searle, 36, who has a PhD in maths, said the problem was spotted by an inquisitive service engineer — not a Sinclair employee — who had opened up a power supply.

A sample was flown to the British Standards Institution, which tests electrical products with a 4kv overload. The power supply was safe with an overload of up to 2kv.

Mr Searle said the batch of power supplies had been bought from a sub-contractor — which Sinclair will not name — by Timex, which makes most UK Spectrums in Dundee.

He said: "Timex had bought from them before. They assumed it would be designed to the same design rules and they only checked it out that it performed the same and it does.

"I'm afraid I can't say whose fault it was that when samples came in they were checked for functional working and not for safety.

"Obviously, in future we will not rely on that sort of thing."

He said the problem could affect the number of Spectrums available because power supplies for them were being diverted for replacements.

He explained that it was difficult to find makers of power supplies, but now a further manufacturer had been found and was bringing its plans forward to meet demand.

Sinclair spokesman Bill Nichols said power supplies arriving at a specially-opened small warehouse in Cottenham, Cambridgeshire, were being replaced within 48 hours.

When the problem was discovered, about 14,000 were still in stock at retailers or in warehouses.

Potentially dangerous power supplies have a black lead with a thin white stripe and a smooth-surfaced — not textured — finger-grip on the jack plug. It only affects power supplies with Spectrums bought between January 1 and four weeks ago.

The address for recalled power supplies only is: Sinclair Research Ltd, Unit F, Broad Lane, Cottenham, Cambs, CB4 4SW.

No fears about micro rivals

Three types of computer makers are out to tempt buyers in the UK, according to Sinclair's Nigel Searle.

First, there were the home-grown products — like the Oric-1 and the soon-to-be-launched Electron, a "cut down" BBC micro from Acorn. "But we are quite confident we can deal with them," said Mr Searle.

Then there were the "me-too" products made in Hong Kong and sold here very inexpensively.

Mr Searle said: "If we were to remain at the low end we could conceivably worry about it. If the ZX81 were our only product it could concern us. As long as we're innovative I'm not too worried about it."

And the third challenge? He said: "We would be foolish to dismiss Japanese competition. They can make consumer electronics which are extremely attractive to the consumers and I think it's going to be a very tough competitor in that battle.

"You haven't got to wipe them off the face of the earth, but you have got to be comparable and I'm quite confident we can do that.

"I don't think they compete on price. They have a number of technologies which are not available from other sources. It may well be that a new standard in mini-floppies will be set by them.

"They know how to build a product at a low price and build up volume very quickly. I think everyone in the world has got something to learn from them.

Sinclair's £¾m new headquarters

We can take our place in the market alongside them.

"The Japanese never make inroads early on. It's not a matter of life or death that they have a product in the market this year or next year. There is an advantage in waiting until the market settles down."

He talked of price-cutting in America and said: "Let Texas Instruments beat their brains out and everyone else's out. We could not afford to sell a machine (the TI-99/4A) for £100 and make enough profit to re-invest."

Managing director Nigel Searle

Cashing in for electric car

Sinclair Research, valued at £124m, will have 50 per cent more staff by this time next year, said new financial director Bill Matthews.

At present there is 55 staff — 33 at the new £¼m Cambridge headquarters, seven in London and the rest in St Ives, working on a flat-screen TV project, and in Winchester, developing "communications based solid state products."

Managing director Nigel Searle said a condition of chairman Clive Sinclair selling five per cent of his Sinclair shares to City institutions was that computer-related products would remain in the company.

Mr Searle said: "He could not, for example, make up an electronic burglar alarm and set up a separate company."

Mr Sinclair's plan is to use the money he raised to finance an electric vehicle project, unconnected with Sinclair Research.

And Mr Searle revealed: "Clive's life is insured for a substantial amount of money."

Mr Matthews said: "The company was not one penny better off as a result of the sale of those shares.

"Although we have a substantial amount of cash compared with other companies we sometimes look at our cash and wonder if we have got enough to do what we want to do. We might have to look at other sources of cash."

He said the company was on target for its predicted £14m profit at its year-end this week.

Tiny TV on your table soon

Sinclair's tiny TV, with a two-inch screen, will be on sale in June or July — "but that's not a hard and fast date."

Cautious spokesman Bill Nichols said: "We want to make sure we have the production in quantity.

"The most interesting thing will be when we blow it up to nine inches and integrate it with a computer."

Made by Timex in Dundee, the TV set will sell at about £50 and measure six inches by four inches by one inch.

Mr Nichols said: "It would be an ideal product for breakfast TV. Instead of walking into the lounge with your cornflakes you could watch it on the kitchen table."

The new Sinclair computer was on the stocks for the second quarter of next year.

He said: "It is something which integrates the flat screen, twin Microdrives and Spectrum technology.

"It's going to be for the more sophisticated user as well. It is very unlikely we would launch anything this year apart from peripherals.

"The strategy is to work our way up-market gradually. We want to take the user with us."

Commenting on an American magazine report about the new computer, he said: "Where they got that £300 figure from I don't know. There just isn't a price on it."

Double boon for upgrade buyers

Owners of 16K Spectrums are being offered two bonuses if they buy 32K upgrades from Sinclair Research.

All purchasers of the £60 upgrade will get:

- A free Sinclair 48K cassette program of their choice, and
- the chance to buy a ZX Printer at £39.95, instead of the normal price of £59.95.

A spokesman said: "To ensure fair treatment, Sinclair is making the upgrade available in sequence of purchase and mailing its customers in batches.

"No orders can be taken at this stage from more recent buyers."

Financial director Bill Matthews

Psion sales top a million

Sinclair Research says it has reached a landmark with the sale of the one-millionth Psion cassette for the ZX81 and Spectrum.

Best seller by far had been Flight Simulation, for both computers, closely followed by applications software like Vu-File and Vu-Calc.

Micro control for new HQ

The new home of Sinclair Research could have been an old church — but in the end they settled on a former Victorian mineral water bottling plant.

At the opening of the £¾m headquarters, architect Christophe Grillet said: "I looked at two old chruches with Clive, but it wasn't practicable."

The project took just nine-and-a-half months, starting with a phone call from Mr Sinclair from New York.

Mr Grillet said: "It's probably the most pleasant job I've had in a long time because I only had to deal with Clive Sinclair — no directors, no committees. I went to everyone who worked there at the time and asked them what they did."

The main L-shaped building in Willis Road, Cambridge, has been restored and houses offices and research labs. The former outhouses have been remodelled as general offices and clad in stainless steel.

The yard between the two has been enclosed as a reception area, featuring a bronze sculpture called Double Torso II, by Helaine Blumenfeld.

A heat exchanger extracts heat from the original well, plus a second bore hole, taking out water at 12 degrees and returning it at 10 degrees. More energy comes from solar panels on the roof.

Top Ten programs for the Spectrum

1	The Hobbit	Sinclair (Melbourne House)
2	Flight Simulation	Sinclair (Psion)
3	VU-3D	Psion (Psion)
4	Time Gate	Quicksilva (Quicksilva)
5	Penetrator	Melbourne House (Melbourne House)
6	Hungry Horace	Sinclair (Psion/Melbourne House)
7	Chess	Psion (Psion)
8	Avenger	Abacus (Abacus)
9	3D Tanx	D K Tronics (D K Tronics)
10	Planetoids	Psion (Psion)

Compiled by W.H. Smith. Originating company given in brackets.

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BUSINESS

QUICK-CHANGE: Price list editor: prices of single entries or whole lists changed by user chosen factors. Minimum system required: 16K level II: please state memory size for diskette system. Instructions included: cassette **£9.95** sssd/dd mini-disk **£12.95** inclusive of packing, post. VAT extra.

COMMISSION-02: Calculates commission pay for those in small businesses. No statutory deductions. Instructions included: cassette **£8.95** sssd/dd mini-disk **£12.95** inclusive of packing, post. VAT extra.

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They said he was too young

Nigel Stuart

Micro whizz-kid Nigel Stuart was told he was too young to take a computer science O-level — although he has a best-selling computer game on the market.

Luckily Nigel, 16 in May, has been accepted in evening classes for a two-year course in computer technology.

Now Nigel, of Timperley, Manchester, says: "I'd like to start my own software company eventually."

He has computer science teacher Edwin Molineaux, of Wellington Boys School, Timperley, for interesting him in the basics of computing.

The first time Nigel used a computer was when he sat down in front of the school's Commodore PET two-and-a-half years ago. Then he bought a ZX81 and later replaced it with a Spectrum.

Nigel came across Macronics Systems, which is selling his game, at a computer show at the University of Manchester Institute of Science and Technology.

Managing director Ken Macdonald looked at the cassette and decided to put it on the market. There are two games, Devil Birds and Digger Man for the 48K Spectrum, on the same tape for £4.95. Two more at the same price, ET/Seekey, have since been released. These are also available in a 16K version at £3.95.

Another program by Nigel is due out in a month. His newer programs will have at least 20 per cent machine code. Nigel said: "I don't find BASIC difficult. I don't really have to think about it. And machine code is not as difficult as I thought it would be."

Nigel's father, Glenn, is a telephone engineer. Nigel said: "I've tried to explain it to him, but I just lose him."

Mr Macdonald said: "I've got a couple of programs. Would you like to look at them?' He's got a natural flair for programming."

Macronics Systems, 26 Spiers Close, Knowle, Solihull, West Midlands

Together we can help

A group of companies was meeting today to thrash out the details of an association to protect them — and their customers.

The Computer Trades Association aims to boost public confidence in home computing by setting up a professional body with which consumers can lodge complaints about bad service and substandard goods.

And by bringing the different aspects of the microcomputing trade together in one association, it hopes to be able to tackle problems like software piracy more effectively.

Hardware and software producers, distributors and retailers, and computer consultants, will all be represented by the association. Later on the computer press may be included too.

The association held its first meeting on March 5. At that time, temporary officials were elected and "had a speculative chat about what we were going to do and how we'd go about it", said a leading member.

Nigel Backhurst was elected acting general secretary, and Tony Sheil, of Knot Komputing, is acting chairman.

Three working groups, set up at the first meeting to look at different problems facing the industry, are to report back on their preliminary findings today.

The association has asked Chancellor Geoffrey Howe to adjust tariff barriers so that UK manufacturers are in the same position as foreign companies.

At present the import levy on computer components is roughly twice the levy on imported computers

Computer Trades Association, 108 Margaret Street, Coalville, Leics LE6 2LX

Your micro remembers to tell you

You can run your family with your ZX81 plus a new program called Home Clock Family Bulletins. It works like an alarm clock, but also reminds you what you should be doing when the alarm goes off.

It costs a reasonable 20 dollars and consists of two interleaved programs. The first is a clock/calendar which displays a digital clock — showing date, hour and minute — on the top half of the screen.

You can then set an alarm and when that time arrives the program displays the word ALARM at the bottom of the screen.

The other program functions as a bulletin board that can accept up to 10 32-character messages which can be edited or erased. Each appears, one at a time, for 12 seconds each in the centre of the screen.

A special message can also be entered to appear only when the ALARM time comes round.

Even though you cannot use your computer for anything else while the program is running, it does free the TV. It turns out that many users, especially those with smaller home micros, don't realise that they can disconnect their TVs while a program is still running, without detrimental effect to the set or the program.

Error handling is excellent, the manual comprehensive and the company will replace the program free of charge if it gives problems within 30 days. King software is at 85 Myrtle Street, Lowell, Massachusetts 08150. It was written for the US version of the SX81, called the Timex/Sinclair 1000, but will run on the UK model.

TV commercials show the fight for business with widespread price cuts. Texas Instruments has just lowered the price of its TI-99/4A home computer by 48 dollars which means, with the present 100 dollar rebate until mid-April, it can cost under 150 dollars.

The official list price is 450 dollars, even though TI officials consider that ridiculous in view of the fact that the average was closer to 300 doollars even before the 100-dollar rebate.

The latest reduction is a bid to make the machine more competitive — profit margins are a bit higher on some other machines. It's likely that the customer will only get a 30-dollar reduction with the rest improving the dealers' profits. Commodore and Atari are also in the price-cutting game.

I will be watching with interest next month's launch here of the computer you know as the ZX Spectrum. It is being marketed by Timex as the Timex/Sinclair 2000 and is slightly modified from the Spectrum. It is the first colour computer to offer at least 48K of RAM and cost less than 200 dollars.

It is the second Sinclair computer to be offered by Timex. The first, the TS 1000 (ZX81 to you) is said to have sold a million. For the new launch, Timex is planning to offer 40 home management and business applications as well as some educational and games programs.

Timex is predicting that a huge cottage industry will spring up due to the machine. I will also push the micro in educatio nareas, as well as introducing a line of home health care products to be used with the computer to monitor blood pressure, weight, temperature and the like.

See you next week...

Bud Izzo
Fairfield, California

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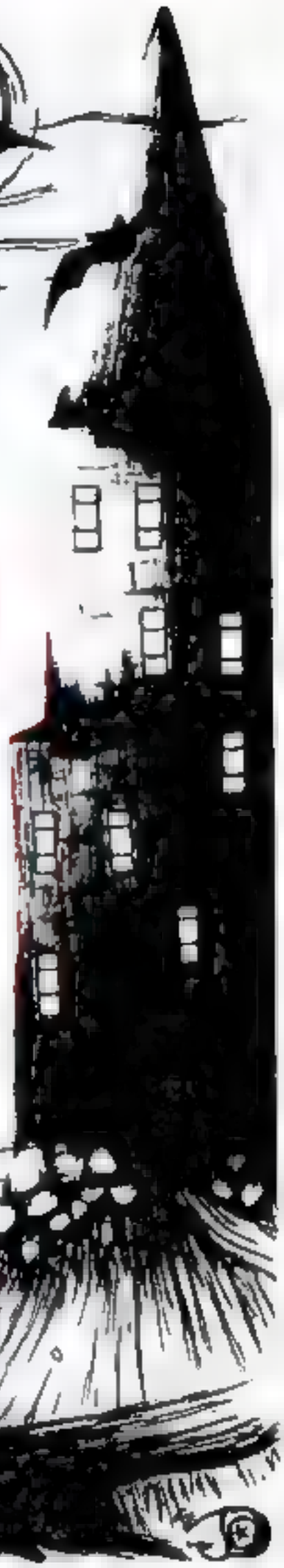

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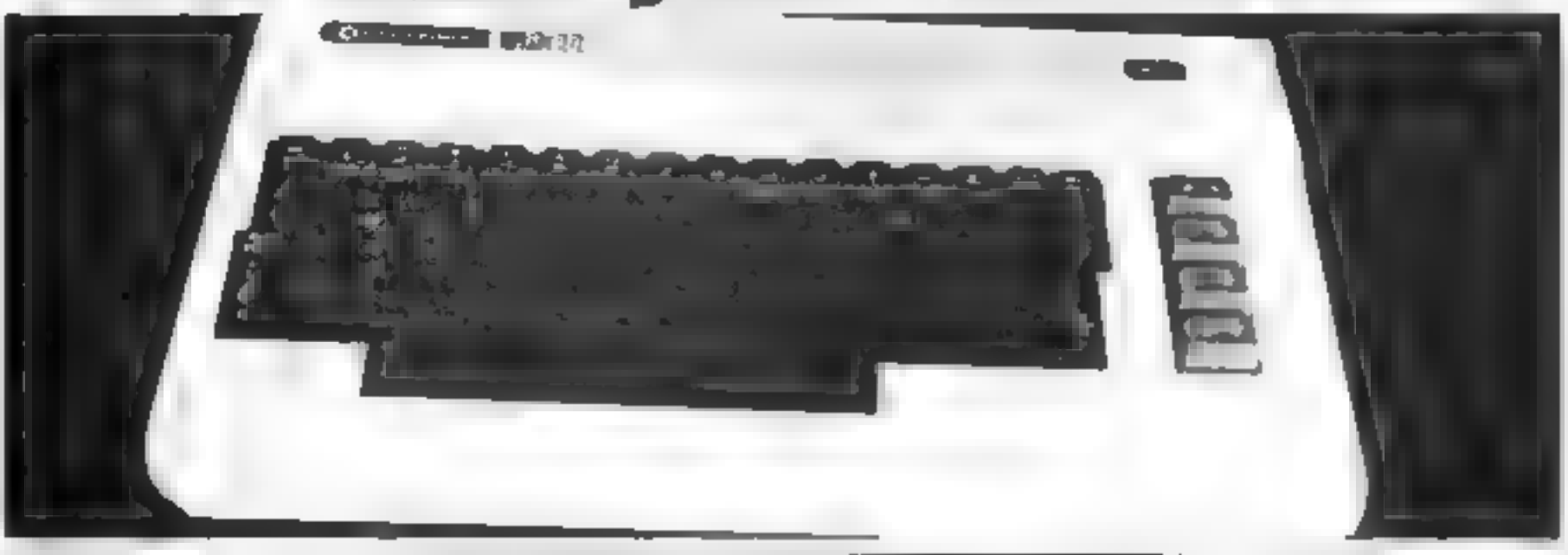
HCW

How does your VIC sound?



Looking for faster sound effects for arcade games? Allen Webb offers some speedy advice

Most VIC owners who write their own arcade type games in Basic will know how slow and dated Basic is when programming sound effects

The programs here offer a way of producing a very wide range of sound effects at great speed

Probably the most common type of sound generating routine is of this form

```
10 POKE 36878, VOL
20 FOR FR = SF TO FF
STEP DF
30 POKE SR, FR
40 FOR I = 1 to DE
NEXT I
50 NEXT FR
60 POKE 36878,0
```

The routine plays a sequence of notes on voice SR, starting at frequency SF and finishing at FF with an increment or decrement of DF. This routine is both slow and consequently inflexible

The machine code routines given are essentially the same as the above routine but with an added 'off period delay'. This enables the user to specify the time that the note is on and the time that the note is off

The ratio of these two periods is generally called the 'mark-space' ratio. This ratio has a significant effect on the tonal quality of the sound and its volume

Listing 1 gives a basic loader for the routines. They can be located at any area of free RAM starting at address SA

The first routine at address (SA + 12) gives a falling sequence of notes and the routine at (SA + 86) a rising sequence. Both routines use a set of memory locations in the cassette buffer for parameters. These locations are

840 Delay fine adjustment
841 Off period delay
842 On period delay
844 Frequency increment or decrement
845 Finish frequency
846 Start frequency

Once stored these values remain unchanged so that the tone needs only a sys call to play it.

The on or off delays are controlled by locations 840,841 and 842. 841 and 842 are coarse adjustments and 840 the fine adjustment.

The actual delay times are approximately: Time = Coarse setting × (5 × Fine setting + 6) + 1 micro seconds

If the fine setting is 199 then the coarse setting will specify the delay in milli-seconds. The maximum delay possible is roughly a third of a second

The start and finish frequencies and the increment should be specified so that the increment is a whole fraction of the frequency range, such as

Start 90, finish 200, increment 10 or Start 97, finish 130, increment 3

Listing 1 — sound demonstration routine

```
10 DATA 96,0,173,...,202,208,247
20 DATA 96,...,169,12,141,14
30 DATA 44,...,174,...,3
40 DATA ...,...,3,208,...,3
50 DATA ,40,...,...,142,...,144,173,74
60 DATA ...,...,240
70 DATA ...,...,141,...,44,32,...
80 DATA 4,...,4,...,0,141,...,144,184
90 DATA ...,...,...,...,72,...,...,138,72
100 DATA ...,...,141,...,44,173,...,3,141,...
110 DATA ...,...,...,...,...,...,169,...
120 DATA ...,...,...,...,...,...,141,...,3,142
130 DATA ...,...,...,...,...,...,0,3,...,176,4
140 DATA ...,...,...,...,...,...,...,0,...,141
150 DATA ,...,44,...,...,...,...,76,...,...,169,0
160 DATA 14,...,4,144,...,4,0,...,104,168,104,96
170 ...F...J...M...NE...FF...SA
180 E...T...T
190 FOR...S...F...T...NE...T
200 ...T...,...,...,...,...=10,56
210 F...S...T...,...,...,...,...,...,...,
```

If this is not true — e.g. start 100 finish 10, increment 4 the sound effect will not be as expected.

The basic loader has a short demonstration portion in lines 270-360. This should clarify the use of the routines

Conversion hints

Since the routines are in machine code they should, in theory, be usable in any machine with a 6502 chip. They do, however, use the specific sound registers in the VIC and these would require alteration for other machines. A source code listing is included for interested readers

```
 40 A=-624:POKE840,76:POKE841,255:POKE842,255:POKE846,225:POKE845,230:POKE844
,1
400 PRINT"{HOME}  SPACE RATIO = 1   RISING SEQUENCE WITH  REDUCING ON PERIOD"
410 FOR T=1TO99:POKE840,PEEK(840)-1:SYSSA+86:NEXT
420 POKE842,PEEK(842)-10
430 FOR T=1TO99:POKE840,PEEK(840)-1:SYSSA+86:NEXT
440 SYSSA+86:SYSSA+86:NEXT
450 FOR T=1TO99:POKE840,PEEK(840)-1:SYSSA+86:NEXT
460 POKE840,100:POKE842,0:POKE841,255:POKE846,225:POKE845,230:POKE844,1
470 PRINT"{DOWN}  OFF PERIOD          {RVS}NO SEQUENCE WITH  REDUCING ON PERIOD"
480 FOR T=1TO30:NEXT
490 POKE842,PEEK(842)-10
500 FOR T=1TO99:POKE840,PEEK(840)-1:SYSSA+86:NEXT
510 FOR T=1TO99:POKE840,PEEK(840)-1:SYSSA+86:NEXT
520 PRINT"{DOWN}  OFF PERIOD          {RVS}FALLING SEQUENCE WITH 5 MILLISEC ON PERIOD"
530 POKE840,100:POKE842,10:POKE841,0:POKE846,230:POKE845,200:POKE844,1
540 FOR L=1TO30:SYSSA+12:NEXT
550 PRINT"{DOWN}  OFF PERIOD          {RVS}845 AND 846 SET FOR A FALLING SEQUENCE BUT
PLAYED ";
560 PRINT"AS RISING      SEQUENCE"
570 POKE840,100:POKE842,10:POKE841,0:POKE846,230:POKE845,200:POKE844,1
580 FOR A=1TO30:NEXT:PRINT"
590 PRINT"{DOWN}INCREASING NARROW SPACE FALLING SEQUENCE WITH 5 MILLISEC ON PERIOD"
600 POKE 40,100:POKE842,10:POKE841,0:POKE846,230:POKE845,200:POKE844,1
610 FOR L=1TO100:POKE841,L*2:SYSSA+12:NEXT
```

Listing 2 — source code

```
MUS.S.....PROE 0001

LINE# LOC   CODE        LINE

0001  0000                        ;VIC SOUND EFFECTS
0002  0000                        ;
0003  0000                        ; A E WEBB 1982
0004  0000                        ;
0005  0000                        *=$1200
0006  1200                  VOL=$900E
0007  1200                  TONE=$900C
0008  1200                  FINE=$0340
0009  1200                  OFFDEL=$0349
0010  1200                  ONDEL=$034A
0011  1200                  SPARE=$034B
0012  1200                  DELTF=$034C
0013  1200                  FEND=$034D
0014  1200                  FSTART=$034E
0015  1200                  COARSE=$00
0016  1200                  ;
0017  1200  A6 00           DELAY   LDX COARSE
0018  1202  A0 48 03        L1      LDY FINE
0019  1205  88              L2      DEY
0020  1206  D0 FD                    BNE L2
0021  1208  CA                      DEX
0022  1209  D0 F7                    BNE L1
0023  120B  60                      RTS
0024  120C  48              DOWN    PHA
0025  120D  98                      TYA
0026  120E  48                      PHA
0027  120F  8A                      TXA
0028  1210  48                      PHA
0029  1211  A9 0F                   LDA #15
0030  1213  8D 0E 90                STA VOL
0031  1216  AD 4E 03                LDA FSTART
0032  1219  8D 4B 03                STA SPARE
0033  121C  AE 4B 03        L3      LDX SPARE
0034  121F  AD 4B 03        L4      LDA SPARE
0035  1222  18                      CLC
0036  1223  ED 4C 03                SBC DELTF
0037  1226  CD 4D 03                CMP FEND
0038  1229  F0 20                   BEQ OUT1
0039  122B  8D 4B 03                STA SPARE
0040  122E  8E 0C 90                STX TONE
0041  1231  AD 4A 03                LDA ONDEL
0042  1234  85 00                   STA COARSE
0043  1236  20 00 12                JSR DELAY
0044  1239  AD 49 03                LDA OFFDEL
0045  123C  F0 DE                   BEQ L3
0046  123E  85 00                   STA COARSE
0047  1240  A9 00                   LDA #0
0048  1242  8D 0C 90                STA TONE
0049  1245  20 00 12                JSR DELAY
0050  1248  4C 1C 12                JMP L3
0051  124B  A9 80           OUT1    LDA #0
0052  124D  8D 0E 90                STA VOL
0053  1250  68                      PLA
0054  1251  AA                      TAX
0055  1252  68                      PLA
0056  1253  A8                      TAY
0057  1254  68                      PLA
0058  1255  60                      RTS
0059  1256  4A              UP      PHA
0060  1257  98                      TYA
0061  1258  48                      PHA
0062  1259  8A                      TXA
0063  125A  48                      PHA
0064  125B  A9 0F                   LDA #15
0065  125D  8D 0E 90                STA VOL
0066  1260  AE 4E 03                LDX FSTART
0067  1263  8D 4B 03                STA SPARE
0068  1266  AE 4B 03        L4      LDX SPARE
0069  1269  AD 4B 03                LDA SPARE
0070  126C  18                      CLC
0071  126D  6D 4C 03                ADC DELTF
0072  1270  CD 4D 03                CMP FEND
0073  1273  F0 21                   BEQ OUT2
0074  1275  8D 4B 03                STA SPARE
0075  1278  8E 0C 90                STX TONE
0076  127B  AD 4A 03                LDA ONDEL
0077  127E  85 00                   STA COARSE
0078  1280  20 00 12                JSR DELAY
0079  1283  AD 49 03                LDA OFFDEL
0080  1286  F0 DE                   BEQ L4
0081  1288  8D 00 12                STA DELAY
0082  128B  A9 00                   LDA #0
0083  128D  8D 0C 90                STA TONE
0084  1290  20 00 12                JSR DELAY
0085  1293  4C 66 12                JMP L4
0086  1296  A9 00           OUT2    LDA #0
0087  1298  8D 0E 90                STA VOL
0088  129B  68                      PLA
0089  129C  AA                      TAX
0090  129D  68                      PLA
0091  129E  A8                      TAY
0092  129F  68                      PLA
0093  12A0  60                      RTS
0094  12A1                          .END
```

Listing 3 — symbol table

```
SYMBOL  VALUE
COARSE  0000    DELAY   1200    DELTF   034C    DOWN    120C
FEND    034D    FINE    0349    FSTART  034E    L1      1202
L2      1205    L3      121C    L4      1266    OFFDEL  0349
ONDEL   034A    OUT1    124B    OUT2    1296    SPARE   034B
TONE    900C    UP      1256    VOL     900E
```

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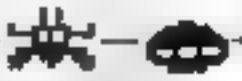

ROAD RUNNER (32K) £8.50 Cassette/£9.90 Disc
The only full feature machine-code version of the arcade game available for the B.B.C micro. Features include scrolling screen, radar display, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty and sound effects.

GALAXIANS (32K) £8.50 Cassette/£9.90 Disc
Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, hi-score, rankings, bonus laser bases, increasing difficulty, superb graphics and sound.

CENTIPEDE (32K) £8.50 Cassette/£9.90 Disc
Incredible arcade type game featuring mushrooms, flea, snails, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the mushrooms increase.

FRUIT MACHINE (32K) £8.50 Cassette/£9.90 Disc
Probably the best fruit machine implementation on the market. This program has it all. HOLD, NUDGE, GAMBLE, moving reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

ALIEN DROPOUT (32K) £8.50 Cassette/£9.90 Disc
Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joystick.

INVADERS (32K) £8.50 Cassette/£9.90 Disc
Superior version of the old classic arcade game including a few extras. 48 marching invaders drop bombs that erode your defences, and 2 types of spacecraft fly over releasing large bombs that penetrate through your defences. Hi-score, increasing difficulty, superb sound effects and graphics.

SPACE FIGHTER (32K) £8.50 Cassette/£9.90 Disc
Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of marauding alien live at you and may attempt to ram you. Separate attack phases, fuel dumps, asteroids, repeating laser cannon, smart bombs, hi-score, rankings, 6 skill levels, bonuses.

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Now for Tandy Color owners as well:

2. DECODE Machine Code COLOUR/DRAGON cartridge £18.40
This cartridge could save you a small fortune! DECODE converts TANDY COLOR BASIC programs to DRAGON BASIC and vice versa. Just load a TANDY tape on your DRAGON, or a DRAGON tape on your TANDY COLOR, and run DECODE to convert the program into the other BASIC! (Prove it works — convert it back again!) Now all you COLOR computer owners can take advantage of all that lovely DRAGON software!

Introductory price

3. DASM Machine Code DRAGON cartridge £18.95
A true 6809 assembler for the DRAGON computer. Assembly statements are entered in BASIC mode and can be intermixed with BASIC statements. Use BASIC for load and save and for editing source ... simple and no time wasted learning new commands. A sophisticated product for a demanding task. (Available mid March 1983)

4. SPACE RACE Machine Code COLOR/DRAGON cartridge £18.95 cassette £ 7.95
Action packed arcade game. Chase around the rack destroying hordes of aliens — watch out for the mines! Uses keyboard or Joysticks. 15 skill levels, high resolution graphics, sound. Addictive.

5. G-TREK BASIC COLOR DRAGON cassette £7.95
Super space adventure game, graphics and sound, destroy the Klingons before they get you. Real time operation (no time for tea!)

6. DESERT GOLF BASIC COLOR DRAGON cassette £7.95
High resolution display and good sound effects.

7. POKER BASIC COLOR DRAGON cassette £7.95
Fast action, excellent graphics and sound, machine code assisted for speed!

8. PIRATES AHOY BASIC COLOR DRAGON cassette £7.95
An adventure game. Solve the puzzles to find all the treasure ... absorbing.

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'DRAGONFORTH' is an implementation of Fig-FORTH for the DRAGON 32 microcomputer but with a difference.

As well as the enormous power of the FORTH language, 'DRAGONFORTH' can also execute BASIC statements. This combines the superb DRAGON sound, graphics and Floating-Point commands with the tremendous speed of FORTH to produce an unparalleled hybrid. You can write a whole program in BASIC or a whole program in FORTH or any mixture of both.

If not already convinced send £2.50 for the 60-page manual (redeemable against first order).

'DRAGONFORTH' is professionally packaged, sensibly priced, guaranteed for life and will be despatched by return complete with free demonstration graphics program.

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HCW1

Is your Atari the GT model?

More hidden features of the Atari exposed by Marc Freebury. This week: extra graphics modes and how to use them

Atari computers are without doubt versatile. Their graphics and sound are the envy of many — but how do you use them?

In documentation, the Atari fails itself. From the manuals, you might perhaps learn that the Atari has three major support chips, taking a lot of the work from the CPU.

One is called POKEY, and handles the sound generation, the paddles, joysticks and general input/output. ANTIC is dedicated to the TV display, and feeds information to the third chip, CTIA.

CTIA sends the signal that reaches your TV. What the manuals do not say is that British Ataris don't have CTIA, but an upgrade called GTIA. The replacement chip allows three extra graphics modes that are modes 9, 10 and 11 in Basic.

The three modes have a strange format — 80 horizontal pixels by 192 vertical. The differences between the modes are listed below.

mode	colours	luminances	resolution
9	1	16	80x192
10	9	16	80x192
11	16	1	80x192

To make sure your Atari is equipped with GTIA, try this program in Basic:

```
10 GRAPHICS 9
20 GOTO 20
```

If the screen goes black and stays black, you have GTIA. So, now you have it, what can you do with it? Try this simple program:

```
10 FOR I=1 TO 15
20 COLOR I
30 PLOT I*3,0: DRAWTO
   I*3, 191
40 NEXT I
50 GOTO 50
```

Don't forget — the first line should be something like 5 GRAPHICS 11. This works well for graphics mode 11 and displays the default colours, the normal Atari colours. The information for each colour is usually stored in a Colour Register. These registers exist at memory locations 704 to 712 and hold the information on each colour in the form:

16 *Luminance + Colour

Each mode dedicates one register to the background in some way. The registers available and the ones chosen for background vary from mode to mode. In graphics mode 9, Colour Register 4 is the background register. So the command

```
SETCOLOR 4,0,0
```

```
Poke 712,0 (Luminance 0,
Colour 0 — 0*16+0=0)
```

are the same. Wait a minute, though. Didn't I just say the colour registers began at location 704? Surely register 707 is the one we want? No, and this is why I've brought in the idea of colour registers.

Registers 704 to 707 cannot be reached by the SETCOLOR command. So, when you use mode 10, with 9 colours, you have to be prepared to do a bit of work with Poke. Try this:

```
10 GRAPHICS 10
20 FOR I=0 TO 8
30 POKE 704+I, I*16+5
40 COLOR I
50 PLOT I*9, 191
   DRAWTO 40,0
60 NEXT I
70 GOTO 70
```

As you can see, this screen format does not give a particularly good vertical resolution. If you change a register, everything drawn with that register is also changed on-screen. This allows some very interesting possibilities.

What if we cycle the colours through the registers with a simple loop? Modify the above program as follows:

```
70 A=PEEK(704)
80 FOR I=705 TO 712
90 POKE I-1, PEEK(I)
100 NEXT I
110 POKE 712,A
120 GOTO 70
```

The screen now gives a sort of spinning top effect. This could be developed further to give some quick and easy screen animation. Finally, here is a table of the graphics modes and the registers they use:

mode	register	notes
0	710	background (always COLOR 0)
	712	border
	709	text luminance
1 & 2	708	normal text colour
	709	lower case colour
	710	reverse field colour
	712	border & background
3, 5 & 7	708	COLOR 1
	709	COLOR 2
	710	COLOR 3
	712	border & background
4 & 6	708	COLOR 1
	712	border & background
8	709	luminance of Colour 1 (colour taken from background)
	710	background
	712	
9	712	colour for background & border. COLOR varies luminance of colour plotted (same as background)
10	704	background & border
	705	COLOR 1
	706	COLOR 2
	707	COLOR 3
	708	COLOR 4
	709	COLOR 5
	710	COLOR 6
	711	COLOR 7
	712	COLOR 8
11	712	luminance for background & border. COLOR varies colour plotted (same luminance as background).

Delaying tactics of micro firms

In your first issue, Henry Budgett editor of Computing Today, suggests that the micro industry needs a code of practice to eliminate or at least reduce the number of bugs in new machines before being offered to the public. I am sure that all enthusiasts will agree with him.

Another aspect of commerce in general and the micro industry in particular which requires looking into is the practice of sending money for a product and then waiting weeks or even months for delivery.

When an advertisement states 'sent by return of post' or 'please allow twenty eight days for delivery', and the weeks go by, tempers are not the only things to be lost.

How much, I wonder, has been added to the original cost of the machine by phone calls and writing letters? How much, I wonder, has been added to the original amount sitting in the manufacturers account?

If we take any recent new micro, put the average cost as £100, and assume 1000 customers sent for it in the first week (not unreasonable figures) that's £100,000 sitting in someone's account gaining interest.

What I visualise is some kind of bureau to which orders are sent. This would hold the money and forward the order to the manufacturer, and only forward the money on receipt of a guarantee of posting to the customer. Running costs would probably come out of the interest, and, who knows? maybe the long-suffering customer could get a rebate.

R.G. Bennett, Rotherham, South Yorks.

My calendar of dismay

I have just bought the first copy of your magazine and would like to add my observations to those of C. Luke (letters page), regarding his problems with Oric Products.

The sequence of events is as follows.

July 12 last year — order Spectrum.

Send your letters to Letters, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0FE. We cannot answer queries on this page

October — see report in a computer magazine that a new computer Oric 1 is to be launched. Looks better than Spectrum.

8 October — 13 weeks since ordering Spectrum, still no sign so write and cancel order.

11 October — Phone Tangerine and order 48k Oric. Confirmation of order received. Delivery date given as third week in January.

22 October — Spectrum arrives.

25 October — Return Spectrum unopened. Wait 6 weeks for refund on credit card.

January/February — see four reviews on Oric in computer mags. Worried to see that all four state only two colours are available on screen at any one time, not all eight as claimed by Oric/Tangerine.

February 7 — Phone Tangerine regarding display colours and told that reviews are "rubbish". Also query delivery as Oric is now nearly three weeks overdue. Told that 48k Orics are having to be tested, hence the delay on that model.

February 24 — Phone Tangering regarding delivery date. Told I should receive computer within two weeks.

March 9 — Buy first edition of Home Computing Weekly. See on letters page that C. Luke has had problems and read John Tatum's reply. Astounded to see that 48k Orics are being despatched in lieu of 16k machines, when it was implied on 7 February that the delivery problems were with the 48k model only, and that people ordering 16k machines and receiving 48k machines will be able to keep the 48k machines at a reduced price.

Here I am, still waiting for my 48k Oric 21 weeks after ordering it, and still expected to pay the full price.

If I hadn't just purchased a W.H. Smith "computer compatible" cassette recorder, I would probably cancel my order for the Oric and buy a Commodore 64. But I don't want to get yet another recorder.

A.J. Leeton, Poole, Dorset

Oric sales director Peter Harding told Home Computing Weekly: "Because we want to keep supplying machines and keep people computing until we get more 16Ks we have offered customers a 48K machine on loan.

"When the 16K becomes available, customers will be asked if they want to purchase the 48K or do a straight swap. The question of discount has yet to be assessed."

How long is a string of strings?

Can any fellow Dragon owner help solve a problem?

I have used the Dragon's CLEAR command to reserve memory space for string use. What I need to know is how much of that memory has been used, and how much is left so that I can tell how many characters I can use before the CLEARed memory is used up.

D. Hardy, Hull, Humberside

Piggyback puzzle for games player

Congratulations on your first issue. I think the contact addresses at the end of each article are a good idea.

In fact I am using one of them right now to get in touch with Hales about their Entex 2000 Piggyback for the Atari 2600 games machine.

Since I already have a ZX81, I wondered whether it was worth upgrading my 2600 for use as a second home computer. Would it be better to stick to my original plan of buying a BBC Model B as my second machine?

Can any of your readers tell me more about the 2600 and its potential as a home computer?

C.N. Hurst, Felixstowe, Suffolk

All work, no play, on the MZ-80A

Our family has recently invested in a Sharp MZ-80A, Sharp twin disk drive and an NEC printer, mainly for use in our small newsagents' business.

We would like to be able to play games on it too, but no matter how hard I look for arcade-type programs in the computer magazines I can't find any for the MZ-80A.

Doesn't anyone else out there own a Sharp computer? Please, please let's see some good games programs for the Sharp.

C. Orton, Claydon, Suffolk.

Bulletin boards band together

With reference to the article on bulletin boards in Home Computing Weekly, the following boards have now joined together to form the Association of Free Public Access Systems (AFPAS).

AFPAS has no commercial use to grind. Our aim is simply to help the hobbyist in the use of computer communications and to standardise computer protocols.

Member bulletin boards include Forum-80 Hull (0482 859169), Mailbox-80 Liverpool (051-220 7933), TBBS London (01 348 6518), Forum-80/Mel 80 (0908 613004), CBBS London (01 399 8530), North East Remote CP/M (0207 32447), ACC (0865 721180), and Bettersfield (closed until July).

Since the beginning of this month, all these systems have been configured to the same standard. This is: baud rate = 300, word length = 7, stop bits = 1, parity = even.

Two methods of file transmission will be available. Firstly standard ASCII and secondly Binary Direct Transfer using Ward Christensen's MODEM protocol, which allows easy error-free file transfer between most types of micros.

The MODEM or XMODEM program for this is available free of charge from the CP/M user group library, or from any bulletin board.

I will send further information to any interested readers on receipt of an SAE.

Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

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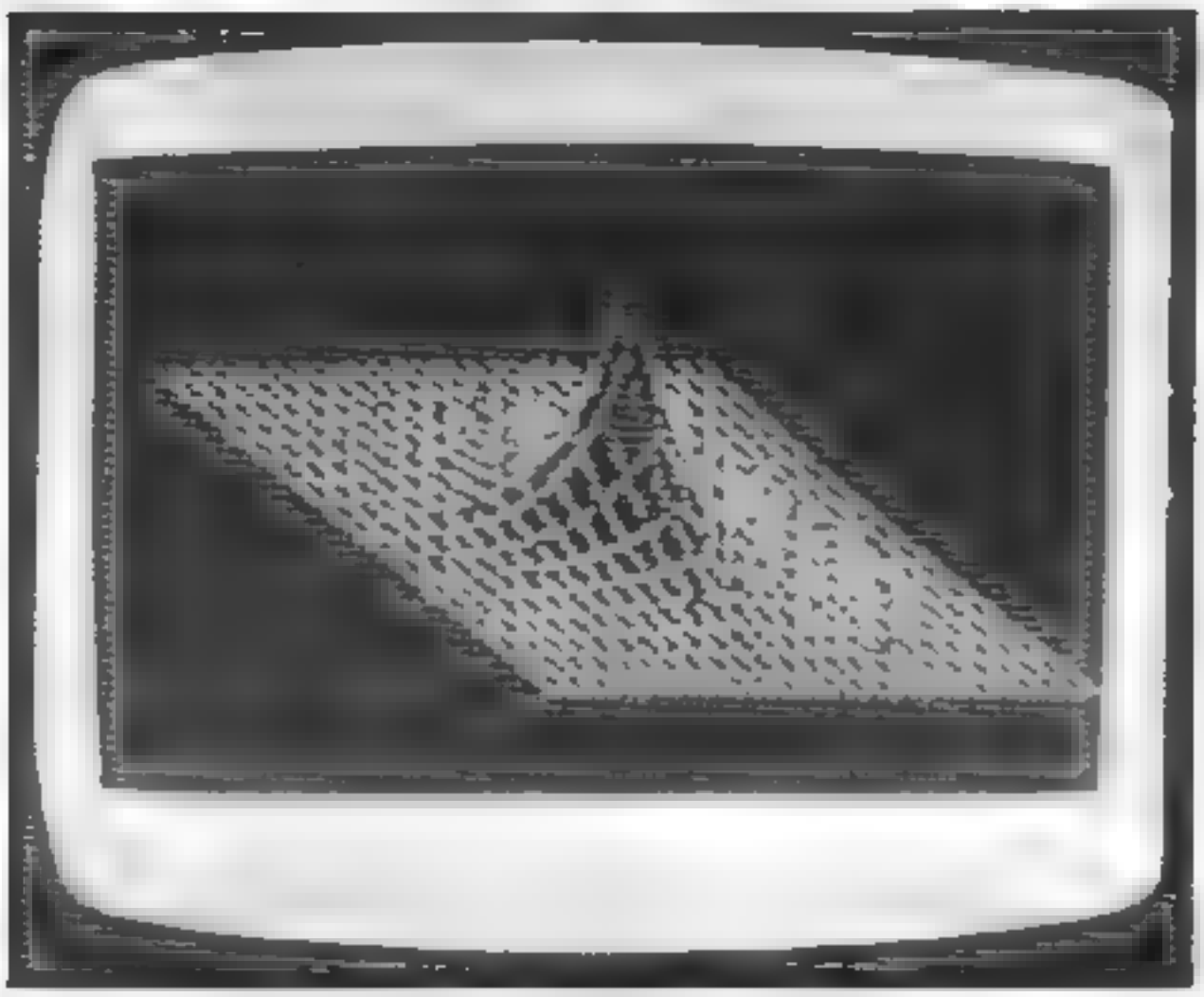

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Help the PoWs dash for freedom

Colditz...the name alone is enough to strike terror in the heart. Duncan Willis challenges you to make an escape bid from the infamous PoW castle

Your task is to help four prisoners of war escape from Colditz. My program runs in less than 8K on old and new ROM PETs/CBMs.

You are presented with a plan view of the castle and the first PoW is placed in the centre of the interior courtyard.

A Reverse field R indicates a position in the wall where a rope, if the PoW has one, can be used to climb over.

Similarly, a reverse field K indicates a door, for which a key is needed. After leaving the courtyard you have to make your way to a 'semi-block' where you have to hand in important documents. Failure to do so means instant death.

You move using the 2, 4, 6, and 8 keys and to obtain a piece of rope move onto the $. For a key move onto a ¶ and for documents move onto a reverse field ↓.

At the beginning of your go a random dice score is shown in the top right hand corner of the screen. After you have moved the indicated number of times, the German officer — the computer — takes his go.

A certain number of guards will be placed randomly in the courtyard and if you are in a two block vicinity you are put in the cells. Once there you stay there. You can decide how many Germans you want at the beginning of the game.

```
5 U=0
10 FORA=1TO40
20 PRINT"■"
30 PRINT"■"TAB(14)"■COLDITZ.■";NEXTA
40 PRINT:PRINTTAB(10)"■■BY■ ■JN ■"
65 PRINT"■■■HOW MANY GERMANS   1 9 "
66 GETU$:IFU$= "THEN66
67 U=VAL(U$):IFU=0ORU 9THEN66
69 H=0:D1MV(5,Y=1
91 FORX=1TO4:R=0:K=0:P=0:S=0
92 R=0:K=0:P=0:S=0
93 M=33180
94 POKE33284,40:POKE33404 40:POKE33524,40
   :POKE33644 40
110 PRINT "■OOOOOOO        OOOOO    OOOOO■"
120 PRINT"        O        O    OOOOOO
130 PRINT"  ■■■■■ (■■■■■■ O■■■ O■■■■■) ■■■■■■■ "
140 PRINT" )      )        O    (      (          "
150 PRINT" )   DO■■■OOO  DO■■■OOO■■■OOO■■■OOOOOO( )  ("
160 PRINT" )   DOOOOO OOOOOOO DOOOOO   OOO( )  ("
170 PRINT" )   ■OO DOO      ) (___ OO OOOOO
180 PRINT" )   )   DOOOOOO=OOOOOOOOOO(___ OO   (
190 PRINT" )   DOOOOOOOOOOOOOOOOOOOOOOOOOO  OO   ("
200 PRINT" )      ■     ■OOOOOOOOOOOOOOOOOOOO ■■■O )   "
210 PRINT"     ■■E( )■■ OOOOOOOO     OOOO    ) (  )  "
220 PRINT"     (___OOOOOOOO DO )_____(  )  ("
230 PRINT"     DOOOOOOOOOOOOOO (      )      )  "
240 PRINT" DOO■■■   OOOOOOOOO (_)     (_____) "
250 PRINT" OO    O■ DOOOOOOOOOOO ■■OOOO■■OOOOOO"
260 PRINT"O(   DOO DOOOOOOOOOOO O=O      (
270 PRINT" O(   )OO DOOOOOOOOOOO(____)    )  O"
280 PRINT"O(   DOOOO(___OO___)OOOOO )    )  O"
290 PRINT"■■   DO (^OOOO DOOOOOO(OOO )    _)  O"
300 PRINT"  )   ■■■O O■ ■■■■ )OO ■■■■O OO O    )  OOO"
310 PRINT" (      (___O_____O_____(  _) O   ■EN OUT■ "
320 PRINT" (_____O_____O_____(    OO"
330 PRINT"          O     O          O"
340 PRINT"           OOOOOOOOOOOO■     ■_ "
341 POKE32996,135:POKE33036,13:POKE  ,6 146
   :POKE33,16 14, POKE  ,5e 1e9
343 POKE33196 142:POKE33236 147:POKE32956,160
345 POKEN 93
347 IF<1THEN 460
350 FORV=0TOY:POKEJ(V) ,09:NEXTV
360 B=INT 6*RND(1)+1)
370 PRINT"■"TAB(29)"      ■YOUR■ "
380 PRINTTAB Y5:"■■■O■"
385 PRINTTAB 44)
390 PRINTTAB 34 "■■■ (:F=■"
395 PRINTTAB 34 "■■■■■■■ E/S■"
396 PRINTTAB 34  ■■■■ ■E ■"
396 PRINTTAB 34  ■■■■OR■■■"
400 FOR =0TO1:NEXT
405 PRINT"■■■■■■■■■"TAB 35 (
420 GETB$:IFB$= "THEN 420
430 IFB$= "■" THEN D=40:GOTO500
440 IFB$= 8 THEN D= 40:GOTO510
450 IFB$="4"THEN D= 1:GOTO480
460 IFB$= 6 THEN D=1:GOTO500
470 D= 420
500 M=M+
505 IFPEEK(M =146THEN 1000
510 IFPEEK M =134THEN 2000
515 IFPEEK(M =45THEN 3000
520 IFPEEK M =36THEN 4000
525 IFPEEK(M)=102THEN 5000
530 IFPEEK(M)=170THEN 5500
535 IFPEEK(M)<>82THENM=M-D:GOTO420
540 POKEM 193
550 POKEM-D,87
570 POKE33284,K+40:POKE33404,R+40
   :POKE33524 S+40:POKE33644,H+40
575 NEXTC
580 GOTO6000
590 RE 1
600 IFH=4THEN720
605 PRINT"■ ■E GERMANS NOW "
610 PRINT"■THEY CAUGHT"4-H"PRISONERS
620 PRINT"■■"■ F  ■RE OFFICER MANAGED TO GET"H
630 PRINT"■PRISONERS OUT OF ■COLDITZ CASTLE ■"
640 PRINT"■■■NOTHER GAME? (Y/N) "
650 GET0$:IF0$=  "THEN650
660 IF0$=  "THENRUN
670 IF0$= N"THENEND
680 GOTO650
690 PRINT"■"TAB(9)"THANK YOU FOR PLAYING "
700 PRINTTHE B "■■■■■■■ESCAPE FROM COLDITZ ■■0"
710 END
720 PRINT"■■■WELL DONE YOU MANAGED TO GET ALL 4
          MEN OUT OF ■COLDITZ CASTLE ■"
```

PET PROGRAM

```
730 GOTO640
1000 REM ROPE ROUTINE
1010 IFR=0THEN1020 0
1020 IFM=33434 OR M=33441 OR M=33445
     OR M=33450THENR1=40:GOTO1050
1030 IFM=33432 OR M=33439THENR1=-1:GOTO1050
1040 IFM=33537 OR M=33544THENR1=40
1050 POKEM,0:M=M+R1:POKEM,19:R=R*-1
1060 GOTO50 0
1070 M=M-R:GOTO1040
2000 REM ICE  PUZZLE
2005 IF=1THEN2040
2010 IF  2THEN 40
2020 POKE ,  8":M=M+1:POKEM,  :M=M  1:P=1
2040 GOTO  0
2040 M=M-R:GOTO 040
3000 REM KEY CARD ROUTINE
3010 IF  2THE  040
3020 K=K+1:POKE 3 ,44  +  4
3040 GOTO540
4000 REM ROPE CARD ROUTINE
4010 IF 4THE  4040
4020 R=R+ :POKE  404  R+40
4040 GOTO540
5000 REM MAN HOME ROUTINE
5001 IFS=0THEN5040
5002 S=1:S=0
5005 PRINT"■■HELL DONE■.THATS ANOTHER ONE OUT."
5010 PRINT"■■0 OF  H OF YOUR MEN HAVE"
5020 PRINT"■■ ESCAPED FROM COLDITZ."■"
5022 PRINT"■■PRESS ANY KEY TO CONTINUE."
5024 GET ;IF =  THEN5024
5026 PRINT ■";GOTO590
5030 PRINT"■SORRY.BUT YOU HAVE TRIED TO ESCAPE
                ■■ITHOUT THE CORRECT";
5040 PRINT" DOCUMENTS AND HAVE  ■BEEN SHOT AS A SPY."
5050 PRINT"■■■RESS ANY KEY TO CONTINUE."
5060 GET ;IF =" THEN5060
5070 PRINT"■";GOTO540
5500 REM DOCUMENTS ROUTINE
5510 IFS=1THEN5530
5520 S=1:POKE33524,(S+48)
5530 GOTO540
6000 REM
6001 PRINT ■"TAB 32)"■EPMAN■"
6002 PRINTTAB(35)"■■0■"
6003 FORJ=1TO5
6004 PRINTING 34
6005 NEXTJ
6010 FORI=1TOL
6020 H=INT 20*RND  +3
6030 =INT 1*RND  +3)
6040 D=3 *68+ 40*L +H
6050 POKEQ,135
6060 FORT=0 4,TOO 50
6070 IFPEEK(T)=193THENGOTO7000
6080 NE TT
6090 F =1+0 ,TOL+
6100 IFPEEK  )=19 THENGOTO"000
6110 NE TT
6115 IF =HTHENGOTO"000
6120 FORT=0+38 (0+4,
6130 IFPEEK(T)=193THENGOTO"000
6140 NE TT
6150 NE TI
6160 REM
6170 GOTO110
7000 FORN=1TO10
7010 T=M 4,:T1=M+39
7020 POKET 160:POKET+1 160:POKET+ 160
7030 POKEM 1 ,160:POKEM ,160:POKEM+ ,160
7040 POKET1 160:POKET1+1 160:POKET1+ 160
7050 FORT=1TO10:NEXTF
7060 POKET 32:POKET+1,3 :POKET+2 3
7070 POKEM 1 ,3 :POKEM 3 :POKEM+1 3
7080 POKET1 32:POKET1+1 ,3 :POKET1+2 32
7090 F =1THEN10 NE IF
7100 NE TH
7120 POKE 31734+ 200:F =1THEN7000:NEXT1
7130 G =  31734+ (Y*4):GOTO540
```


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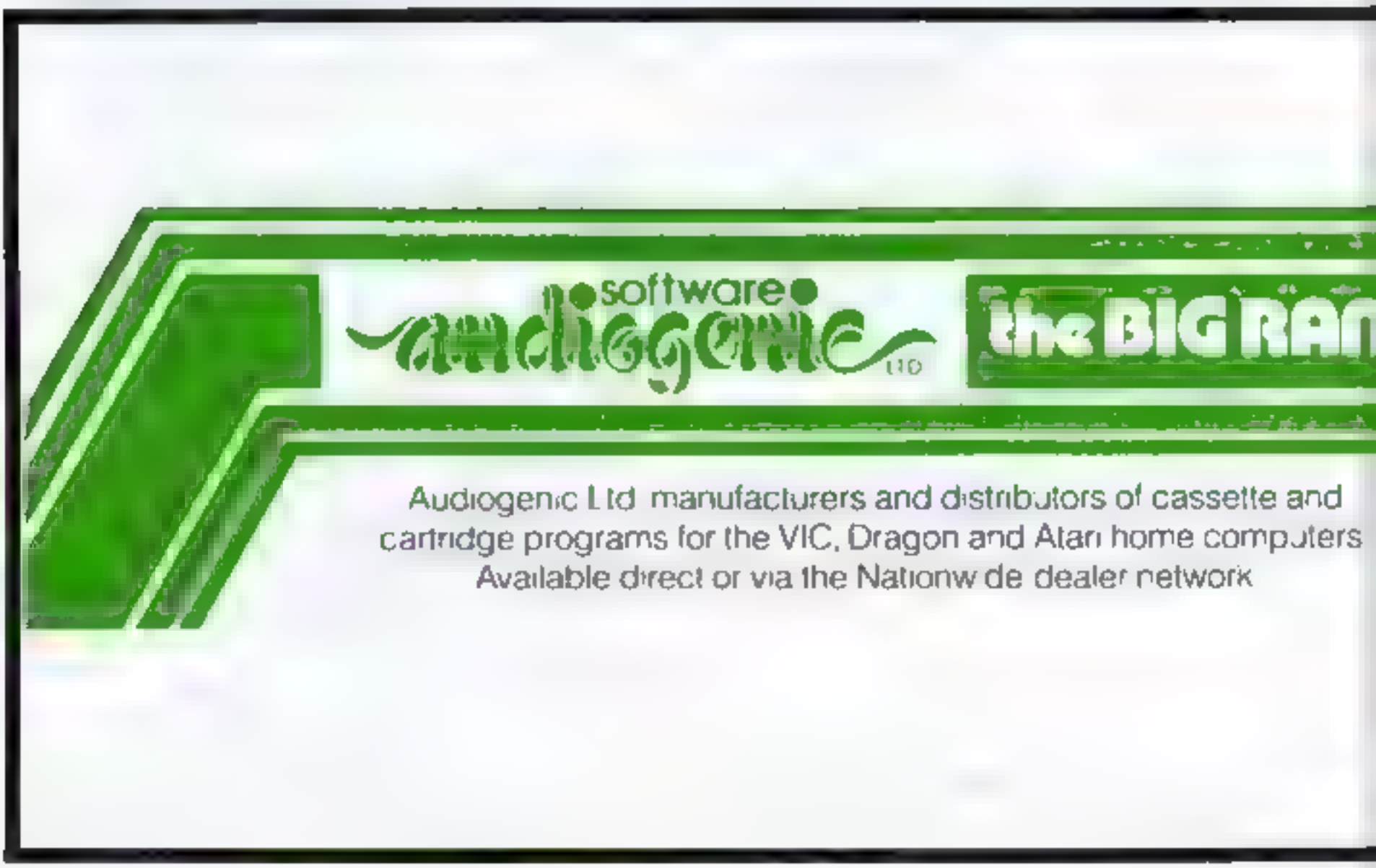

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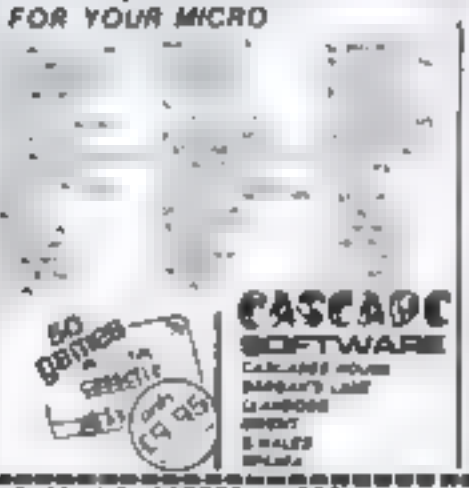

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Balance your budget with a ZX81

Make your bank manager happy with this financial planning program from George Baldwin

If you see red when you open your bank statement, you can use your 16K ZX81 to keep you in credit. My DOMAC program will help you plan the effect on your budget of making a major purchase.

DOMAC will keep one year's accounts for up to 14 different items. For each month of the quarter year you enter in your budgeted or actual costs, and adjustments for any unexpected items. The program then works out monthly, quarterly and cumulative totals, gives you the pre-pay balance (this is the one to keep above your bank's minimum for charges!), your after-pay balance, and the yearly balance which tells you whether you have made a profit or loss on the year. Figure 1 shows you what the quarterly display looks like. You can also use the program to show you a bar chart of your total annual expenditure on each item (Figure 2) or of the amount you spent each month (Figure 3).

You will probably want to change your budget quite often updating it for actual costs or modifying it to try out different spending plans. Domac lets you do just that. When a quarter's display is first shown, the question ANY CHANGES? (Y/N) appears on screen. Entering Y produces a marker dot which can be moved around the screen until it is against the item you want to change. Press C for change and type in the new amount and in a couple of seconds the totals and subtotals are readjusted. When your changes are complete those of you with a ZX printer can then choose to print out the display.

If you use the inverse C as shown in line 9030 of the program, DOMAC should load automatically. If not enter GOTO 400 don't use RUN, or the stored data array will be cleared. First DOMAC will display the program 'menu'. Entering C produces the quarterly displays, and you can select the quarter you want. C gives you the choice of the two graphs and Q allows you to quit if, for example, you want to alter the program.

Y starts the New Year routine, which allows the quarterly data to be reviewed and altered for the next year. And S must be used when you have finished, to ensure that the program is saved complete with new data for use next time. It is a good idea to keep a backup copy on a separate tape.

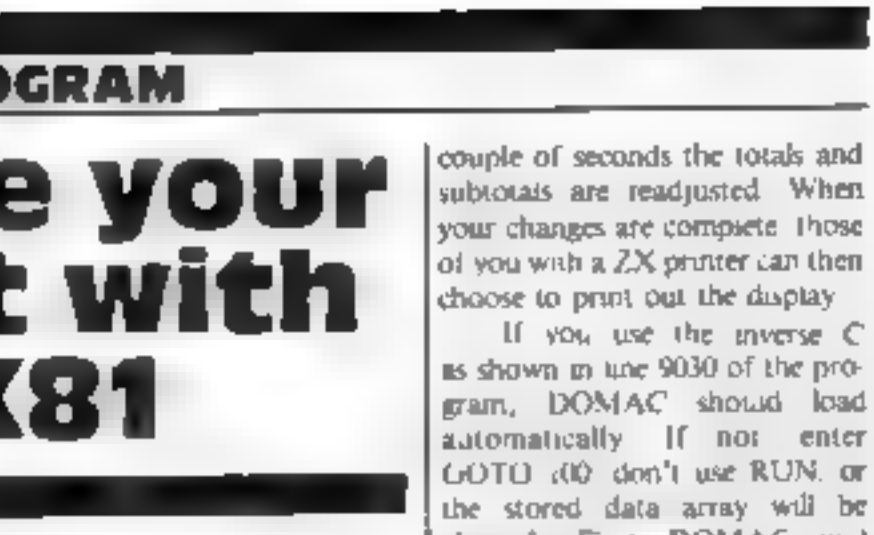
Figure 1. The quarterly display

```
ITEM    JAN   FEB   MAR   QTOT   6QTOT
MORT.   129   129   129    387    1548
RATES     0     0     0      0     515
PHONE     0    54     0     54     108
ELEC.     0    82     0     82     382
GAS       0     0   110    110     661
CAR       0     0     0      0     198
CASH    150    50    90    290     940
INS.      0     0     0      0      92
HOLS.     0   100     0    100     650
SUBS.    24     0    30     54     126
XMAS      0     0     0      0     153
MISC.    15    20    20     55     235
CARD    135    11    53    199     739
SAVS.   650     0    50    619    1519
-------------------------------------
TOTAL  1022   446   482   1950    7417
P.P.B  -104   115   175
PAY    555    542   557   1654    7404
ADJST  190     0     0    190     190
-------------------------------------
A.P.B  661   657   732   (BAL=177
```

Figure 2. Annual spend per item

```
 AS PERCENTAGE OF TOTAL SPEND
MORT.  20.87 ##########
RATES   6.94 ###
PHONE   2.43 #
ELEC.   4.07 ##
GAS     3.52 ##
CAR     2.67 #
CASH   12.67 ######
INS.    1.11 #
HOLS.   8.76 ####
SUBS.   1.73 #
XMAS    1.62 #
MISC.   3.17 #
CARD    9.96 #####
SAVS.  20.46 ##########
-------------------------------------
TOTAL SPEND FOR 1982 =£7417   >>
-------------------------------------
PERCENT   0    10    20    30    40
```

Figure 3. Amount spent per month




```
  1 PRINT "    YOU HAVE JUST TR
IED TO RUN    DOMAC" , YOUR DOME
STIC ACCOUNTS PROGRAM. THIS HAS
DESTROYED YOURDATA. YOU MUST NOW
 RELOAD FROM  TAPE. ONLY USE " R
UN "TO RESET THEPROGRAM COMPLETE
LY.
  2 PRINT "" NEXT TIME, USE
 "GOTO 100"" TO   START THE PROG
RAM."
  3 PRINT "" "      IF YOU WISH
 TO SET UP A      COMPLETELY NEW
 ACCOUNTS FILE,      USE "CONT
 " NOW.
  4 STOP
  9 REM   INITIAL DATA
 10 DIM A(12,17)
 20 LET Y$= 1982
 30 LET F=0
 40 PRINT AT 10,0,"  ENTER ""AF
TER PAY BALANCE" '                FROM
 1981"
 50 INPUT A(16,16)
 60 CLS
 99 REM      MENU
```

```
2660 LET A(I,17)=A(I,17)-D+A(I,M
2670 GOTO 2570
2680 IF I=17 OR I=18 THEN GOTO 2
900
2690 PRINT AT I,5*(M-5)+6,"     "
2700 PRINT AT I,5*(M-5)+6,A(I,M)
2710 PRINT AT 16,5*(M-5)+6,"
"
2720 PRINT AT 16,5*(M-5)+6,A(15,
M)
2730 PRINT AT I,21;"     "
2740 PRINT AT I,21,A(I,6)
2750 PRINT AT 16,21,"     "
2760 PRINT AT 16,21,A(15,6)
2770 PRINT AT I,27,"     "
2780 PRINT AT I,27,A(I,17)
2790 PRINT AT 16,27,"     "
2800 PRINT AT 16,27,A(15,17)
2810 FOR G=0 TO 2
2820 PRINT AT 17,G*5+6,"     "
2830 PRINT AT 17,G*5+6,A(16,5+G)
2840 PRINT AT 21,G*5+6,"     "
2850 PRINT AT 21,G*5+6,A(19,5+G)
2860 NEXT G
2870 PRINT AT 21,25,"     "
2880 PRINT AT 21,25,A(19,17)
2890 GOTO 1330
2900 PRINT AT I+1,5*(M-5)+6,"
"
2910 PRINT AT I+1,5*(M-5)+6,A(I,
M)
2920 PRINT AT I+1,21,"     "
2930 PRINT AT I+1,21,A(I,6)
2940 PRINT AT I+1,27,"     "
2950 PRINT AT I+1,27,A(I,17)
2960 GOTO 2810
2999 REM     GRAPHS
3000 PRINT "WHICH GRAPH?"
3010 PRINT "P=PERCENTAGE SPEND"
3020 PRINT "M=MONTHLY SPEND"
3030 INPUT W$
3040 CLS

3050 IF W$="P" THEN GOTO 3430
3060 IF W$<>"M" THEN GOTO 3000
3070 PRINT "  MONTHLY ACCOUNTS GR
APH
3080 PRINT "  ----------------
----------"
3090 FOR N=16 TO 2 STEP -1
3100 PRINT AT N,5,"■"
3110 NEXT N
3120 PRINT AT 17,3,"0 ■J F M A M
  A S O N D
3130 PRINT AT 12,2,"500"
3140 PRINT AT 7,1,"1000"
3150 PRINT AT 2,1,"1500"
3160 PRINT AT 10,3,"£"
3170 PRINT AT 18,12,"MONTH"
3180 PRINT AT 19,3,"■=APR ■=PAY
  ■=SPEND ■=PPR
3190 FOR M=1 TO 12
3200 FOR N=16 TO 17-INT ((A(19,M
)+50)/100) STEP -1
3210 PRINT AT N,2*M+5,"■"
3220 NEXT N
3230 FOR N=0 TO INT ((A(17,M)+A(
18,M)+25)/50)-1
3240 PLOT 4*M+6,10+N
3250 NEXT N
3260 FOR N=0 TO INT ((A(15,M)+25
)/50)-1
3270 PLOT 4*M+9,10+N
3280 NEXT N
3290 FOR N=16 TO 17-INT ((A(16,M
)+50)/100) STEP -1
3300 PRINT AT N,2*M+5,"■"
3310 NEXT N
3320 IF A(16,M)<=0 THEN PRINT AT
 17,2*M+5,"■"
3330 NEXT M
3340 PRINT AT 21,1,"COPY? (Y/N)"
3350 INPUT C$
3360 IF C$="Y" THEN PRINT AT 21,
4,"
"
3370 IF C$="Y" THEN COPY
3375 IF C$="Y" THEN GOTO 3390
3380 IF C$<>"N" THEN GOTO 3340
3390 PRINT AT 21,1,"PRESS NEWLIN
E TO CONTINUE"
3400 PAUSE 40000
3410 CLS
3420 GOTO 100
3430 PRINT "ITEM PERCENTAGE OF T
OTAL SPEND"
3440 PRINT
3450 PRINT AT 1,0,"MORT.",,"RATE
S",,"PHONE",,"ELEC.",,"GAS",,"CA
R",,"CASH",,"INS.",,"HOLS.",,"SU
BS.",,"XMAS",,"MISC.",,"CARD",,"
LOAN"
3460 FOR N=0 TO 31
3470 PRINT AT 15,N,"-"
3480 PRINT AT 17,N,"-"
3490 NEXT N
3500 PRINT AT 16,0;"TOTAL SPEND
FOR ";Y$," =£";A(15,17),"-->>"
3510 PRINT AT 18,0,"PERCENT    0
    10    20    30    40"

3520 FOR I=1 TO 14
3530 PRINT AT I,6,INT (100*(100*
A(I,17)/A(15,17))+.5)/100
3540 FOR N=22 TO 21+INT (100*A(I
,17)/A(15,17)+.5)
3550 PLOT N,43-2*I
3560 NEXT N
3570 NEXT I
3580 PRINT AT 20,3,"COPY? (Y/N)"
3590 INPUT C$
3600 IF C$="Y" THEN PRINT AT 20,
3,"
"
3610 IF C$="Y" THEN COPY
3615 IF C$="Y" THEN GOTO 3630
3620 IF C$<>"N" THEN GOTO 3590
3630 PRINT AT 20,3,"PRESS NEWLIN
E TO CONTINUE"
3640 PAUSE 40000
3650 CLS
3660 GOTO 100

3999 REM  NEW YEAR ROUTINE
4000 PRINT  NEW YEAR INPUT ROUTI
NE",,
4010 PRINT "■■■■■■■■ -- THIS ROUT
INE DESTROYSPREVIOUS DATA",,,,
4020 PRINT "ENTER ""GO"" TO PROC
EED,OR NEWLINE TO PASS",,,,
4030 INPUT U$
4040 IF U$<> GO  THEN CLS

4050 IF U$<>"GO" THEN GOTO 100
4060 LET Y$=STR$ (VAL Y$+1)
4070 LET F=1
4075 LET A(16,16)=A(16,17)
4080 PRINT "THIS ROUTINE DISPLAY
S LAST YEARSQUARTERLY DATA FOR A
MENDMENT     FOR ",Y$,  , PRESS NE
WLINE TO START"
4090 PAUSE 40000

4100 CLS
4110 LET Q$="M"
4120 GOSUB 1040
4130 LET Q$= J
4133 CLS
4135 GOSUB 1040
4140 LET Q$="S"
4143 CLS
4145 GOSUB 1040
4150 LET Q$="D"
4152 CLS
4155 GOSUB 1040
4130 CLS
4190 PRINT "NEW YEAR ROUTINE COM
PLETE"
4200 LET F=0
4210 GOTO 100
4999 REM   "STOP" ROUTINE
5000 PRINT "PROGRAM STOPPED.",,"
" TO RESTART, ENTER ""GOTO 100"",,
,

5010 STOP
8999 REM    "SAVE" ROUTINE
9000 PRINT AT 10,0,"START RECORD
ER AND PRESS NEWLINE"
9010 PAUSE 40000
9020 CLS
9030 SAVE "DOMA■"
9040 LET F=0
9050 GOTO 100
```

ZX81 PROGRAM

```
  100 PRINT AT 3,5,"WHICH FUNCTIO
N?"
  110 PRINT AT 5,5,"C=COMPUTE/DIS
PLAY"
  120 PRINT AT 7,5,"G=GRAPHS"
  130 PRINT AT 9,5,"Q=QUIT"
  140 PRINT AT 11,5,"S=SAVE PROGR
AM
  150 PRINT AT 13,5,"Y=NEW YEAR"
  160 INPUT W$
  170 CLS
  180 IF W$="C" THEN GOTO 1000
  190 IF W$="G" THEN GOTO 3000
  200 IF W$="Q" THEN GOTO 5000
  210 IF W$="S" THEN GOTO 9000
  220 IF W$<>"Y" THEN GOTO 100
  230 GOTO 4000
  999 REM  DISPLAY (IN FAST MODE!
1000 PRINT "WHICH QUARTER? (M,J,
S,D)"
1010 INPUT Q$
1020 IF Q$<>"M" AND Q$<>"J" AND
Q$<>"S" AND Q$<>"D" THEN GOTO 10
10
1030 CLS
1040 FAST
1050 PRINT "ITEM",TAB 21,"QTOT
 ";Y$(3 TO 4),"TOT"
1060 PRINT "MORT.","RATES",,"PH
ONE",,"ELEC.",,"GAS",,"CAR",,"CA
SH",,"INS.",,"HOLS.",,"SUBS.",,"
MISC.",,"CARD",,"SAVS."
1070 FOR N=0 TO 31
1080 PRINT AT 15,N,"-";
1090 PRINT AT 20,N,"-";
1100 NEXT N
1110 PRINT AT 16,0,"TOTAL",,"P.P
.B",,"PAY",,"ADJST"
1120 PRINT AT 21,0,"A.P.B"
1130 GOTO 1100+CODE Q$
1141 PRINT AT 0,8,"OCT  NOV  DEC
"
1142 LET S=10
1144 GOTO 1180
1147 PRINT AT 0,8,"APR  MAY  JUN
"
1148 LET S=4
1149 GOTO 1180
1150 PRINT AT 0,8;"JAN  FEB  MAR
"
1152 LET S=1
1154 GOTO 1180
1156 PRINT AT 0,8,"JLY  AUG  SEP
"
1158 LET S=7
1160 LET B=12+S-2*INT (S/3)
1165 FOR I=1 TO 19
1170 LET C=0
1180 FOR M=S TO S+2
1190 LET C=C+1
1200 IF I>14 AND I<19 THEN GOTO
1250
1205 IF I=19 THEN GOTO 1290
1210 PRINT AT I,5*C+1,A(I,M)
1220 PRINT AT I,21,A(I,B)
1230 PRINT AT I,27,A(I,17)
1240 GOTO 1310
1250 PRINT AT I+1,5*C+1,A(I,M)
1260 IF I<>16 THEN PRINT AT I+1,
21,A(I,B)
1270 IF I<>16 THEN PRINT AT I+1,
27,A(I,17)
1280 GOTO 1310
1290 PRINT AT 21,5*C+1,A(I,M)
1300 PRINT AT 21,21,"YBAL= ",A(19
,17)
1310 NEXT M
1320 NEXT I
1330 PRINT AT 15,9,"ANY CHANGES?
(Y/N)"
1340 SLOW
1350 INPUT C$
1360 IF C$="Y" THEN GOTO 2000
1370 IF C$<>"N" THEN GOTO 1350
1375 IF F<>0 THEN RETURN
1380 PRINT AT 15,9,"COPY? (Y/N)-
--------"
1390 INPUT C$
1400 IF C$="Y" THEN PRINT AT 15,
9,"----------------"
1410 IF C$="Y" THEN COPY
1415 IF C$="Y" THEN GOTO 1430
1420 IF C$<>"N" THEN GOTO 1390
1430 PRINT AT 15,9,"ANOTHER QTR?
 (Y/N)"
1440 INPUT C$
1445 IF C$="Y" THEN CLS
1450 IF C$="Y" THEN GOTO 1000
1460 IF C$<>"N" THEN GOTO 1440
1470 PRINT AT 15,4;"PRESS NEWLIN
E TO CONTINUE"
1480 PAUSE 40000
1495 CLS
1500 GOTO 100
1999 REM FIND ITEM TO BE CHANGED
2000 PRINT AT 15,5,"SET DOT AND
PRESS ""C""-"
2010 LET X=20
2020 LET Z=26
2030 PLOT X,Z
2040 IF INKEY$<>"" THEN GOTO 204
0
2050 IF INKEY$="" THEN GOTO 2050
2060 IF INKEY$="8" THEN GOTO 219
0
2070 IF INKEY$="5" THEN GOTO 223
0
2080 IF INKEY$="7" THEN GOTO 227
0
2090 IF INKEY$="6" THEN GOTO 232
0
2100 IF INKEY$<>"C" THEN GOTO 20
40
2110 PRINT AT 15,5;"INPUT NEW AM
OUNT----------"
2120 LET M=5-1+X/10
2130 LET I=1+(40-Z)/2
2140 IF Z=4 THEN LET I=18
2150 IF Z=6 THEN LET I=17
2160 LET D=A(I,M)
2170 INPUT A(I,M)
2180 GOTO 2500
2190 UNPLOT X,Z
2200 LET X=X+10
2210 IF X>30 THEN LET X=30
2220 GOTO 2030
2230 UNPLOT X,Z
2240 LET X=X-10
2250 IF X<10 THEN LET X=10
2260 GOTO 2030
2270 UNPLOT X,Z
2280 LET Z=Z+2
2290 IF Z>7 AND Z<14 THEN GOTO 2
300
2300 IF Z>40 THEN LET Z=40
2310 GOTO 2030
2320 UNPLOT X,Z
2330 LET Z=Z-2
2340 IF Z>7 AND Z<14 THEN GOTO 2
300
2350 IF Z<4 THEN LET Z=4
2360 GOTO 2030
2499 REM  CALCULATIONS
2500 UNPLOT X,Z
2510 PRINT AT 15,5;"----CALCULAT
IONS----------"
2520 IF I=17 OR I=18 THEN GOTO 2
550
2530 LET A(15,M)=A(15,M)-D+A(I,M
)
2540 LET A(I,B)=A(I,B)-D+A(I,M)
2545 LET A(15,B)=A(15,B)-D+A(I,M
)
2550 LET A(I,17)=A(I,17)-D+A(I,M
)
2560 LET A(15,17)=A(15,17)-D+A(I
,M)
2570 LET A(16,1)=A(16,16)-A(15,1
)
2580 LET A(19,1)=A(16,1)+A(17,1)
+A(18,1)
2590 FOR N=2 TO 12
2600 LET A(16,N)=A(19,N-1)-A(15,
N)
2610 LET A(19,N)=A(16,N)+A(17,N)
+A(18,N)
2620 NEXT N
2630 LET A(19,17)=A(17,17)-A(15,
17)+A(18,17)
2640 GOTO 2000
2650 LET A(I,B)=A(I,B)-D+A(I,M)
```

COMPETITION

Must be won:

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This is the big day — your chance to win a share of the £6,200-worth of prizes we've got waiting. But you can only enter by sending three correctly completed coupons, from this issue and issues 1 and 2.

These are the prizes in our free, easy to enter competition.

★ Fifteen 48K ZX Spectrums, each with a printer and three programs from Sinclair's range. Each of these prize packages would cost you £250 in the shops.

★ Software worth £2,500 from Quicksilva, divided into 100 vouchers of £25 to each winner. The catalogue contains a total of 39 programs for the Spectrum, VIC 20, ZX81, BBC, Dragon and Atari.

All you have to do is answer the questions in the coupon — all based on this week's issue of Home Computing Weekly — fill in your name and address and post it off to us.

Entries will only be accepted if they contain all three coupons (not copies) and they must be correctly addressed to: Spectrum Quicksilva competition, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE.

The first 15 correct entries we open will win the Spectrum prizes and the next 100 will win the £25 software vouchers.

Closing date is first post on Friday April 8 and the winners will be named in Home Computing Weekly.

This competition is not open to the staff of Home Computing Weekly, Argus Specialist Publications, Alabaster Passmore, Sinclair Research and Quicksilva. The editor's decision is final and no correspondence will be entered into.

Watch out for more great competitions soon in Home Computing Weekly.

Entry coupon No. 3

1 Speedy advice from?
2 Star rating for centipede
3 Subroutine 600 is called by
4 Y starts what?

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6 What runs in less than 8K?
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Please write clearly and send your entry to: Spectrum/Quicksilva Competition, Home Computing Weekly, 145 Charing Cross Road, London WC2H 0EE. Closing date is first post on Friday April 8.

Strategy for survival in the software game

Tough times are ahead for software companies, but Silversoft is determined to come through. Candice Goodwin finds out how

Frantic last-minutes preparations for the launch of three new Spectrum programs were underway when I called into Silversoft's offices at 2 Broadway, Hammersmith, west London. Technicolor posters of the new offerings — Cyber Rats, Slippery Sid and Muncher — brightened up the walls, and boxes of cassettes awaited despatch.

Hammersmith is just a temporary resting-place for Silversoft, bridging the gap between the cramped office it occupied in central London — 'you couldn't get four people in there at once" and the more spacious premises in Ealing that it is due to move to shortly. But Silversoft itself is also making a transition, "from a hobby to a way of life", as founding partner David Paterson puts it.

It all started up in Glasgow and, like many a good idea before it, in a bar. David Paterson, then a management services manager in a brewery, and Dougie Bern, a computer engineer for Olivetti, were discussing computers and bemoaning their lack of money. The two themes came together, and David and Dougie started to write games for the ZX81 in their spare time, selling them by mail order.

Their first attempt, a Startrek game written by David and launched in October 1981, was an immediate success. Business boomed, and in February 1982 David started to work for Silversoft full time.

But shortly afterwards, a combination of factors hit Silversoft hard, leading to a "disastrous" next few months. The launch of the Spectrum meant that sales of ZX81 software plummetted. At the same time, the big High Street retailers started to sell software, undermining mail order sales.

For a while, things looked bleak. But David and Dougie rallied, by diversifying into software for the Spectrum and selling their programs through W H Smith & Boots. Now Silversoft is a thriving concern again, and estimated turnover for 1983 is around £1 million.

But for Silversoft's staff work is still pleasure rather than business. The company now has three full-time employees — David, Dougie and Hugh Jarse — who all know each other from their Glasgow days. Dougie is David's wife's cousin and Hugh is an old friend of Dougie's, who joined them to help out with the Christmas 1982 rush and stayed on.

David Paterson — "I'm the bureaucrat"

Dougie Bern handles Silversoft's advertising

As the business developed, David and Dougie had to give up writing programs themselves. David now handles administration. "I'm the bureaucrat", he says — and acts as company spokesman. Dougie deals with advertising and publicity. And Hugh takes care of distribution, has the daunting task of ensuring that all the programs get parcelled off to their correct destinations.

To write the programs, they have a team of 10 freelance programmers, whose ages range from 15 to 35, but are mainly school kids and students. David himself is positively elderly by the standards of the software business at 35, though he claims to be "a child at heart", while Dougie, at 21, has done a degree in electronics and worked for Burroughs' small business machines division as well as working for Olivetti and helping to set up Silversoft.

They receive a lot of material from hopeful would-be programmers, but only a small proportion of it can be used. "One per cent of it is fine, nine per cent has potential, but ninety per cent is useless", according to Dougie.

Silversoft concentrates on adaptions for the ZX81 and Spectrum of popular arcade type games, a formula which has worked well. "We sell established games because people won't pay five or six quid for something they don't know". David and Dougie have painful memories of Alien Dropout — "a great game, a sort of mixture of Galaxians and Invaders" — which flopped because people didn't know what to expect from it.

When Silversoft's name is firmly established in the High Street, though, they may start to experiment again: "people think, well, I've bought ten games from them and they've all been good, so let's give this new one a try."

Talking of names, Silversoft must be one of the few companies whose name was actually chosen by computer. The partners got together for a brainstorming session and came up with a ▶

list of 60 names — "some of them were really ridiculous" — out of which they picked a shortlist of four. They had written a program that assigned random numbers, and used it to give marks to each of the names on the shortlist. In five trials, the name "Silversoft" came out top four times.

Partly to write new games and partly to diversify into software for new machines, they plan to take on some full-time programmers in the summer. Despite reservations about some of the Oric's features they plan to support it, and possibly the BBC Micro too.

Along with other software companies, Silversoft's partners foresee "a shake-out" in the next few months, with many of the smaller companies going to the wall. "The market is changing. It was largely a mail order, hobbyist market. Thanks to Clive (Sinclair), it has become much more of a consumer market. People are becoming more discriminating."

They are optimistic, though, about Silversoft's prospects. Says David, "I have no doubts that we will weather it. We intend to be here in three years' time."

Change is the price of survival in such a competitive market and Silversoft is increasingly having to adopt a "more professional approach" to both producing and marketing its products.

At the moment, physically producing the program cassettes is a major problem. There are very few companies offering a tape duplicating service, and the ones that do have more business than they can handle. To decrease the lead time between writing a program and actually getting it on to the retailer's shelves, Silversoft plans to tighten up coordination between itself and its duplicating company.

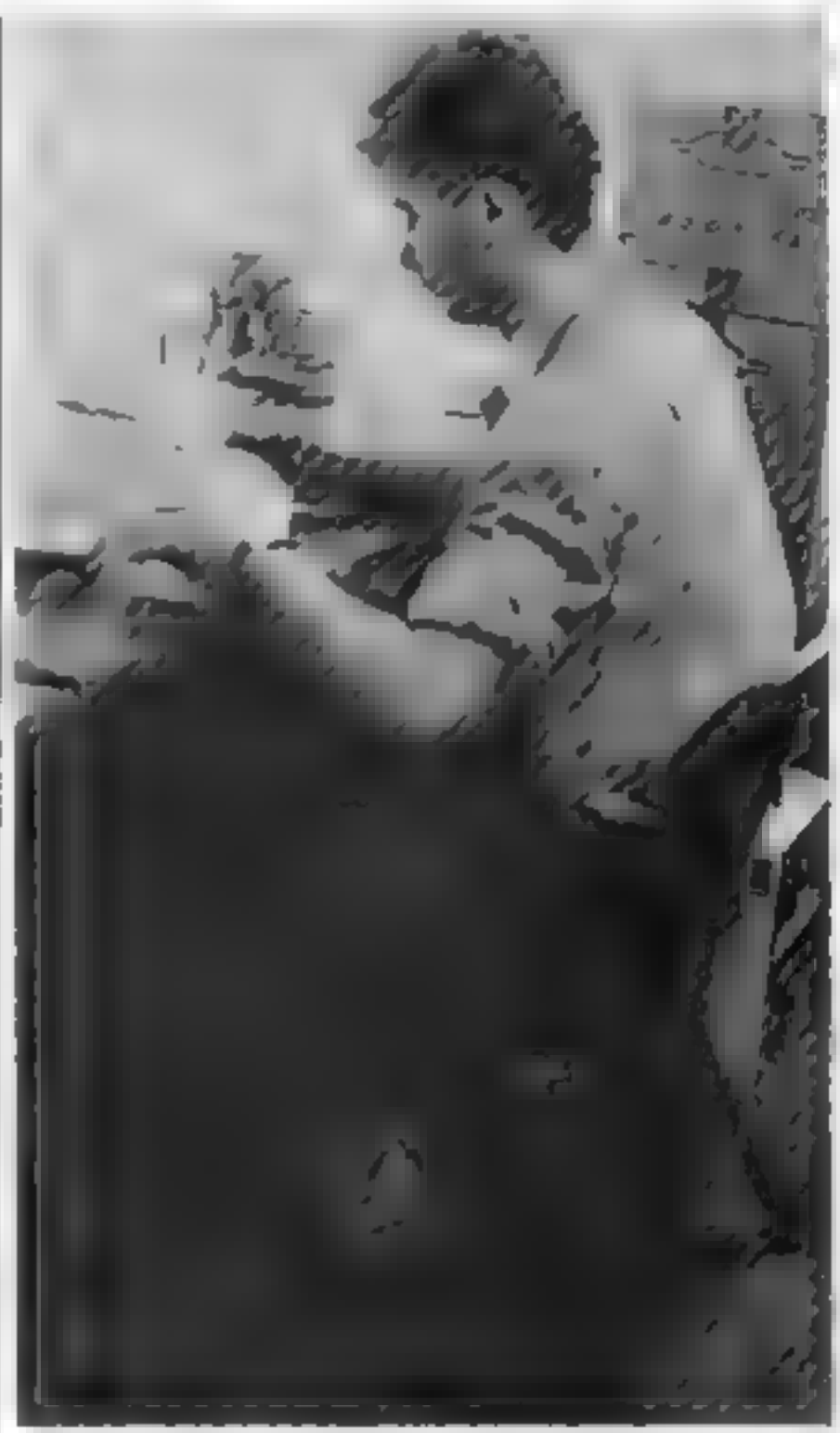
By better organisation, it also hopes to offer a better level of service to its retail outlets. As well as Smiths and Boots, it is negotiating with Debenhams and John Menzies, through which it already sells programs in Scotland. "They say to us, oh, you're Scottish, we'll take 5 000". But it will continue to support its loyal mail order customers too.

As for advertising, David and Dougie estimate that they will have to spend around £50,000 per year just to keep up with the competition — a sum that drastically reduces the profit that they can expect to make on each cassette. As part of their advertising campaign, the posters adorning the office walls reflect their new, glossier image they aim to better even the "red-hot" presentation of software companies like Imagine profiled in Home Computing Weekly a fortnight ago.

Advertising is all-important because software companies' survival depends on selling a lot of cassettes — according to Silversoft, the profit on each cassette is fairly small after paying for distribution, manufacturing, royalties, packaging and promotion.

Because of this, David feels particularly strongly about software libraries — 'pirates without the skull and crossbones" — which copy cassettes and lend them out without software companies' permission. "Ultimately it will make the customer suffer if it's not an economic proposition to bring out new programs". He hopes that software companies will act together to take legal action against software pirates.

For the time being, though, sales are holding up well. With new offices, new staff and a new image, Silversoft will have well and truly emerged from what David calls its "cottage industry stage" — hopefully without losing the enthusiasm that carried it through the hard times.



Hugh Jarse prepares a program for despatch to a mail-order customer

Dougie, Hugh and David check out a Silversoft program

From golf course to outer space with VIC-20

Four new games for the VIC-20 are put through their paces by our reviewer Allen Webb

Golf
VIC-20 plus 3K
£7.95

Audiogenic PO Box 88,
Reading, Berks.

In my experience, golf programs vary tremendously, simply depending on the programming method used. Through good use of graphics, this package has done the job well.

Even with the extra 3K of memory needed, fitting the program in is a problem. Memory limitations account for several of the game's peculiarities. A booting program giving a full set of instructions precedes the main program, which loads automatically.

The data for each hole also has to be loaded from tape as and when required. While keeping the memory load down, this results in long pauses during the game. Shortage of memory also explains why only nine holes are offered.

Each hole is displayed as a map using standard graphics characters and colours to indicate the rough, sand traps and other hazards. This is done well, and the holes are attractive and clear.

You 'hit' the ball by first selecting a club and the angle of shot. The ball's behaviour is also affected by the value of your handicap. After each shot, the position of the ball is shown on the map as a flashing square, allowing you to see the effect of your stroke. This is a very good idea, in my opinion, which increases the feeling of hitting a real object.

Once the ball has landed on the green, you see a close-up of the putting field. When you succeed in potting the ball, your score card is displayed prior to loading the next hole.

Only one real complaint — too little information is given on the position of the ball relative to the hole after each shot. The program gives the approximate distances per character, but it's not easy counting the number of characters on a uniformly [illegible].

instructions	90%
playability	80%
graphics	80%
value for money	85%

Alien Blitz
VIC-20
£7.95

Audiogenic, PO Box 88,
Reading, Berks.

In spite of the unfamiliar name this game turned out to be a rather unexceptional version of the old favourite — Space Invaders.

Standard-shaped aliens are well-drawn and nicely animated, but I was surprised at the lack of colour: all objects on the screen are white.

The aliens move smoothly, accompanied by the mandatory "heart-beat" sound. Unfortunately all other sound effects are very poor, and started to get on my nerves very quickly.

The moveable laser bases can either be controlled by joystick or by the two shift keys and space bar. But I found the latter method very awkward to use.

Level of play can be varied for 0 (easy) to 9 (you must be joking), but seems to be no more than a simple control of the aliens's speed. Level selection is followed by a demonstration game. Surprisingly, no high score option is available.

instructions	70%
playability	60%
graphics	60%
value for money	60%

Bonzo
VIC-20 plus 3K
£7.95

Audiogenic, PO Box 88,
Reading, Berks.

This is an original game with some of the flavour of Panic. A small man has to be moved down a series of levels linked by ladders, using either a joystick or the keyboard.

On the various levels are boxes which the man picks up by moving over them. Each box yields points to the player. But to make life difficult, the levels are inhabited by green natives called Bonzos, whose greatest delight is to leap on the man if they can.

If the screen is cleared, it is refilled with higher scoring boxes, but an extra nasty is supplied. This is repeated three times before returning to the first screen. The player has four lives, and at the end of the game there is a high score table for successful players.

Technically the game is excellent, using both sound and colour to the full. An extra large screen is used, and the figures, because they consist of six redefined characters, are brilliantly animated. The author has put a lot of effort into designing the characters and giving them an endearing quality. I particularly liked the small man, who with his bald head and dungarees, looks rather like the hero in Krazy Kong.

instructions	70%
playability	80%
graphics	95%
value for money	80%

Boss
VIC-20 plus 8K
£14.95

Audiogenic, PO Box 88, Reading, Berks.

Although you wouldn't guess it from the title, Boss is a chess program. Being cassette-based, it is much cheaper than packages like the CBM Sargon, but it does require 8K of memory expansion.

When the program is run, a neatly-drawn board takes up some two thirds of the screen. The pieces, too, are well drawn and easy to identify. Playing information, including the level of play and the current depth of search, is displayed below the board.

The playing level can be set to one of ten levels, giving average response times ranging from 1 second to 4 hours. It can be altered at any stage of the game.

On either side of the level indicator are two clocks to let you compare your speed with the VIC's. You can see the current moves by each player in the bottom corners — the right hand corner actually shows the machine's alternative moves as it is thinking. Between the two move indicators is a move counter.

The program uses the usual alphabetic notation and is very easy to use. The input is well written and all errors were trapped.

I played the program at level 0 using my standard opening, and found that it reacted identically to the Apple Sargon II up to move 9. This suggests that the Audiogenic program may use a similar algorithm to the more expensive program.

instructions	60%
playability	80%
graphics	90%
value for money	90%

Tornado
VIC-20
£5.95

Quicksilva, Palmerstone Park House, Palmerstone Road, Southampton.

This adaptation of Scramble features the usual scene setting for your mission. I have my doubts about the idea of "mercy bombs" and sentences like "meanwhile destruction blossoms all around in necessary destruction" — but let's not mix morals and metres.

There's a one or two player option, high score recording, plus the right sort of sound effects. After you have reached 1,000 points, the enemy fighters swarm on in never-ending waves until your three lives are used up.

Unfortunately there is no keyboard equivalent of the joystick controls, and my Commodore joystick responded only fitfully even after several attempts.

Though this game is sold for the unexpanded VIC, it loads quite happily in the expanded version. Without the expansion, it ran out of memory!

There are better version of this game around but they cost more. you pays your money and you takes your choice.

B.J.

instructions	60%
playability	60%
graphics	60%
value for money	60%

Subspace
Striker/Zor
16K VIC-20
£7.95

Quicksilva, Palmerstone Park House, 13 Palmerstone Road, Southampton.

Subspace Striker is an outer space version of Submarine Attack. You lurk in subspace until a target appears on your scanner. Then up you pop and fire as your prey speeds across the screen.

Retaliation comes mainly in the form of space mines. You select a depth and position, and just sit it out.

This game is no classic, but the graphics are very good and sound effects add to the atmosphere. Once mastered, little skill is needed and whether or not you obtain a high score is largely up to the random number generator. But a good game nonetheless.

In Zor, you take part in a battle between two robots, each taking turns to do their worst to each other as the range slowly closes.

Any hits on you drain your energy, as does putting up your shields to cut down the effect of the enemy fire and, in the second-stage close-combat battle, firing your weapons. But at least your opponent is in the same position.

The aim is to wear down your opponent before he wears you down. Again, once you get the hang of it it doesn't take much skill, and the sound effects are nothing special. Quite nice graphics, though.

B.J.

instructions	60%
playability	60%
graphics	80%
value for money	60%

Harvester
VIC-20
£5.95

Quicksilva, Palmerstone Park House, 13 Palmerstone Road, Southampton.

Strategy rather than quick reactions is what is needed for Harvester. Two, three or four people can play. Each takes it in turn to move in any direction across the 15 x 22 grid of boosterspice plants, collecting a point for each one reaped.

On reaching the edge of the grid or a square that has already been reaped, the player stops, and the next one moves. As the game goes on, it gets harder and harder to move until one player gets stuck. This player loses the round and all their score, while the others move their score on to the next round.

I assume memory limitations are the reason why the program does not check that players move in turn — and why however many players are taking part, there are always four harvesters shown on the grid. Nevertheless an enjoyable, simple but lasting game.

Brainstorm is basically a variation of the old logic problem about how to get a number of people and animals across a river in a small rowing boat with a weight limit.

Once you remember, look up, work out or are told the solution, the game is of no further interest.

B.J.

instructions	70%
playability	70%
graphics	30%
value for money	50%

Starquest/
Encounter
16K VIC-20
£7.95

Quicksilva, Palmerstone Park House, 13 Palmerstone Road, Southampton.

Based around the voyage of the Starship Enterprise, your task in Starquest is to explore new stars. Though attempts are made to recreate the Startrek theme, with hyperspace journeys and photoscans of each new planet, these features are not linked into the game itself which is fairly unsubstantial.

In Encounter a lengthy introduction with shades of Close Encounters is followed by what amounts to a logic test. All you are told is that the aliens are four-fingered humanoids — the rest you work out for yourself.

A clever test, but once you've understood what you're supposed to do, that's it. You can't rerun Encounter, and being second on the tape, it's a nuisance to reload.

B.J.

instructions	20%
playability	30%
graphics	50%
value for money	30%

How does your TI screen seem?

Dreaming of higher screen resolution with your TI 99/4A micro? David Gray shows you how

Standard Basic treats the screen of the TI 99/4A computer as having 32 by 24 characters. But you can get higher resolution by dividing each character position into a number of pixels.

I'll be giving a series of Basic sub-routines to allow you to define and manipulate these pixels.

If we divide each character position into four pixels then, since each pixel may be set or unset, we need 16 (2^4) different patterns, each of four pixels.

We can represent each of these patterns as a four-bit numeral, one bit for each pixel as shown in the illustration. The patterns and their associated binary numerals are shown also.

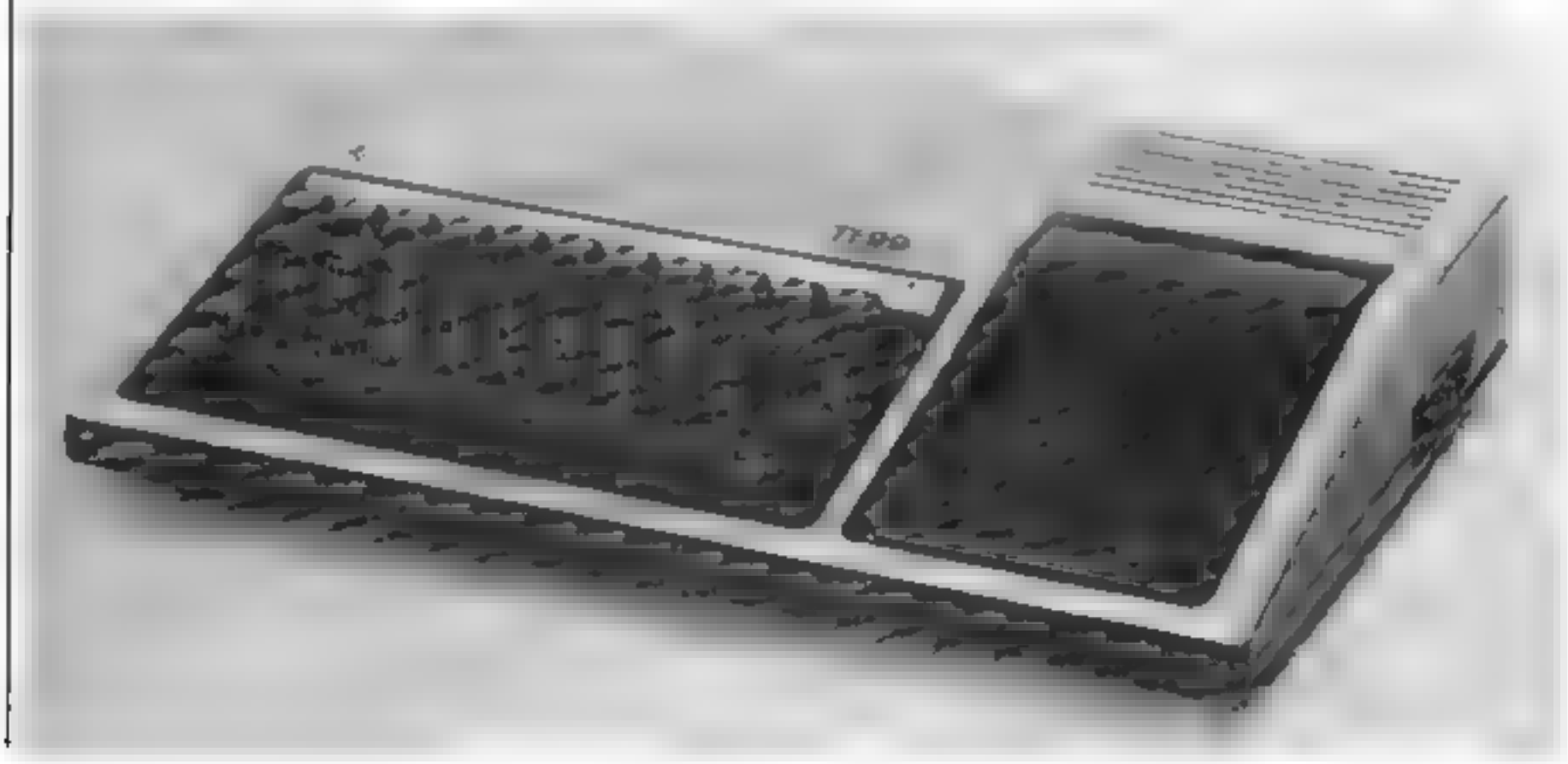
Using four pixels per character position gives us a screen consisting of 64 by 48 pixels. However, since Basic only allows us to write characters we must define one character for each pattern and to set or unset a pixel we must change the complete character containing that pixel.

Our method of numbering patterns makes the determination of the new pattern very simple.

If we start with a pattern p (0.. 15) and wish to set pixel n (0. .3), we get pattern $p+2^n$ (providing pixel n is not already set).

Similarly, unsetting pixel n of pattern p gives pattern $p-2^n$ providing pixel n is already set). For example, setting pixel 2 in pattern 8 gives pattern $8+2^2 = 12$.

On the TI 99/4A computer,



the character at the top left-hand corner of the screen has co-ordinates (1,1). Here we assume that the Xco-ordinates run horizontally from 1 to 32 and that the Yco-ordinates run vertically from 1 to 24

For this article we wish to treat the pixel in bottom left-hand corner as (0,0), so pixel (0,0) will be pixel 0 of character position (1,24).

To access any pixel we must determine which character position it belongs to and which pixel it is of that character position.

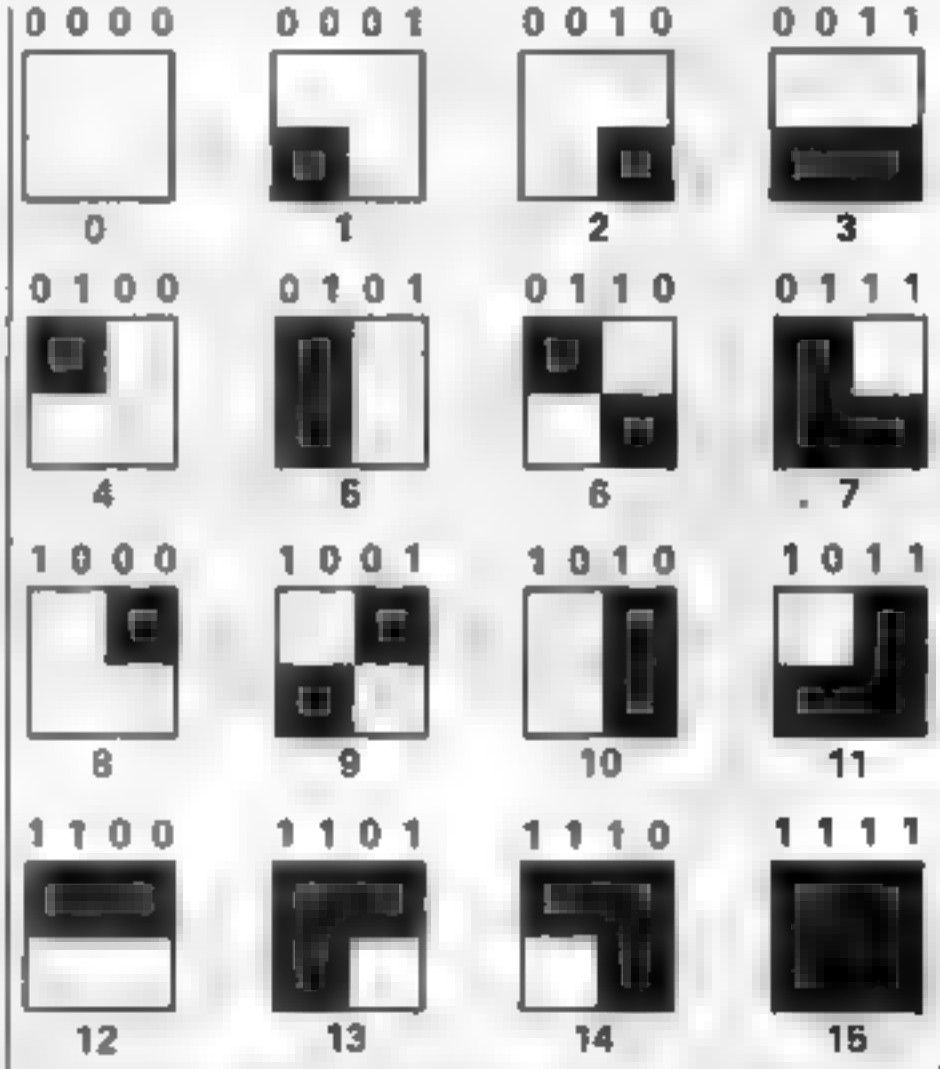
Given pixel (x,y) then the corresponding character position is given by (1+x DIV 2,24-y DIV 2) where x DIV 2 in the integer result of dividing x by 2

The pixel of the determined character position is given by (x MOD 2) + 2* (Y MOD 2) where x MOD 2 is the remainder of dividing x by 2.

Using the above scheme we can write three Basic sub-routines to produce higher resolution — one to initialise a character for each pattern, one to plot a pixel and one to unplot a pixel

3 2 1 0
X X X X

How one character is divided into four pixels. Each character can be represented as a four-bit numeral



Sixteen different shapes can be created by using four pixels in one character pattern. Their binary numbers are shown above each

```
 0 DEF DIV2 X =INT(X/2
20 DEF MOD2 X =X-2*INT(X/2)
30 REM  A SIMPLE TEST PROGRAM
40 REM   FIRST FILL PART OF THE SCREEN PIXEL BY PIXEL
45 GOSUB 500
50 FOR PLOT_X=30 TO 35
60 FOR PLOT_Y=25 TO 30
70 GOSUB 1000
80 NEXT PLOT_Y
90 NEXT PLOT_X
100 REM   NOW REMOVE SOME OF THE PIXELS
110 FOR PLOT_Y=30 TO 25 STEP -1
120 FOR PLOT_X=35 TO 30 STEP -1
130 GOSUB 1100
140 NEXT PLOT_X
150 NEXT PLOT_Y


160 STOP
500 REM   S/R INITIALISE GRAPHICS CHARACTERS
510 DIM PLOT$(3)
520 PLOT$(0)="00000000"
530 PLOT$(1)="F0F0F0F0"
540 PLOT$(2)="0F0F0F0F"
550 PLOT$(3)="FFFFFFFF"
560 PLOT_CH=128
570 FOR PLOT_I=0 TO 3
580 FOR PLOT_J=0 TO 3
590 CALL CHAR(PLOT_CH,PLOT$(PLOT_I)&PLOT$(PLOT_J))
600 PLOT_CH=PLOT_CH+1
610 NEXT PLOT_J
620 NEXT PLOT_I
630 CALL COLOR(13,13,16)
640 CALL COLOR(14,13,16)
650 CALL HCHAR(1,1,28,24*32)
660 RETURN


1000 REM  S/R TO PLOT POINT  PLOT X,PLOT Y
1010 GOSUB 2000
1020 IF PLOT_FLAG THEN 1060
1030 GOSUB 2500
1040 IF PLOT_FLAG THEN 1060
1050 CALL HCHAR(PLOT_Y1,PLOT_X1,PLOT_CH+2^PLOT_BIT)
1060 RETURN
1100 REM  S/R TO UNPLOT POINT  PLOT X,PLOT Y
1110 GOSUB 2000
1120 IF PLOT_FLAG THEN 1160
1130 GOSUB 2500
1140 IF PLOT_FLAG=1 THEN 1160
1150 CALL HCHAR(PLOT_Y1,PLOT_X1,PLOT_CH-2^PLOT_BIT)
1160 RETURN


2000 REM   S/R TO DETERMINE CHARACTER AND PIXEL
2010 PLOT_FLAG=-1
2020 IF (PLOT_X<0)+(PLOT_X>31)+(PLOT_Y<0)+(PLOT_Y>47)THEN 2080
2030 PLOT_X1=DIV2(PLOT_X)+1
2040 PLOT_Y1=24-DIV2(PLOT_Y)
2050 PLOT_BIT=MOD2(PLOT_X)+2*MOD2(PLOT_Y)
2060 CALL GCHAR(PLOT_Y1,PLOT_X1,PLOT_CH)
2070 PLOT_FLAG=0
2080 RETURN
2500 REM   S/R TO SEE IF PIXEL ALREADY PLOTTED
2510 PLOT_FLAG=MOD2(INT((PLOT_CH-128)/2^PLOT_BIT))
2520 RETURN
```

How it works

10,20 Definitions of two commonly used functions.

30-160 A simple test program

500-660 A subroutine to initialise the characters representing the various patterns. These patterns are represented by the characters 128 to 143

650 Sets all character positions to the blank pattern

1000- This subroutine plots the point (PLOT-X, PLOT-Y) on

1060 the screen. It first makes sure that the point is valid by calling subroutine 2000 and then ensures that the point hasn't already been plotted by calling subroutine 2500 Line 1050 uses the formula $p+2^n$

1100- Simular to the subroutine 1000 but for unplotting the point

1160 (PLOT-X, PLOT-Y)

2000- This subroutine determines if the point PLOT-X,

2080 PLOT-Y) is actually on the screen (see Line 2020). If the point is not on the screen then PLOT FLAG is left as true (-1). If the point is on the screen then PLOT FLAG is left as false (0) and the following variables are set:-(PLOT-X1, PLOT-Y1) are set to the coordinates of the character position containing the pixel PLOT-BIT is set to the pixel number within the character position PLOT CH is set to the current character in the character position

2500- This subroutine returns the value false if the pixel PLOT BIT of the

2520 character PLOT-CH is not set and true if it is set

Change the shape of your character

Take the tedium out of designing shapes for your arcade games. Grant Privett's program for the Oric-1 makes it easy

The programming of high quality graphics into a BASIC game is often very much a limiting factor in determining the final speed of the game

It's simply a matter of how many bytes have to be changed every time some elaborate shape — a plane or invader, for example — moves from one screen location to another. The bigger and more elaborate the figure, the slower the movement

This may vary from machine to machine but the principle remains the same for virtually all machines

To alleviate this problem many machines now allow the user access to the locations where the shape of every character is kept. In this respect the Oric is no exception. In fact both character sets can be altered

This means the shape of any normal character may be changed into either a figure by itself or become part of some greater whole. To do this it is necessary to decide which bits of the bytes that make up a character must be set (visible) and which are not set (dark).

If done manually this can be a tedious and painstaking task particularly since the character sets occupy different locations depending on the mode (hi-res or text) in which the change is made

My program allows you to effortlessly experiment with new designs

The cursor controls on the bottom row of the keyboard are used to move an asterisk around within a six by eight pixel [illegible] pressing either S or U, members of the grid are either set — represented by a £ — or left blank

The design currently under construction is displayed throughout so your masterpiece may be considered as it will finally appear, thus reducing errors of scale

When the design is finished pressing I allows you to choose which character is to be changed. The values of the locations to be changed and the values required are then presented.

```
2 CLS:D=PEEK(9,9):V=9:RELEASE [illegible]
4 D=NOT (2):FOR I=0 TO 5: READ C: [illegible]
5 N=INT(120+RND(-45*(CC=4
9 PRINTCHR$(6);CHR$(5)
11 PR NT"[illegible]  ORIC 1"
12 PR NTCHR$(10)"  CHARACTER GENERATOR."
20 PR NT"  [illegible]"
22 PRINT"  MOVE THE ASTER SK AROUND WITHIN"
23 PRINT"  THE MATRIX  WHEREVER YOU W SH"
24 PR,NT"  TO SET A D VEN MATR X LOCAT ON"
25 PRINT"  S MPLY PRESS  S   S M LARLY"
26 PRINT"  PRESS  U  TO RESET  A PO NT"
27 PRINTCHR$(1)"        WHEN YOU ARE HAPPY,SPEED [illegible]"
28 PRINT"  THE MATR,X SHAPE PRESS  I"
29 PR,NT"  SHOULD YOU W SH TO GO T THE"
30 PRINT"  PROGRAM PRESS  D"
31 PRINTCHR$(10)CHR$(5)"  WHEN YOU HAVE READ THIS PRESS  C  TO CONTINUE"
35 A$=KEY$:IFA$=""THEN35
100 HIRES:PRINTCHR$(6
101 PUKE(#800,,,:POKE49040,12:POKE49080,12
102 TOX=1:TOY=1:DRY=1:D=0
103 X=1,Y=1:N=1:V=1
106 FOR A=0TO7:READB:POKE1 0+A,B:
+ 0 CURSET10,20,0
 20  =96 :J=134
 30 DRAW1,0,1 DRAW0,J,1
140 DRAW 1,0,1 DRAW0,  J
160 CURMOVE   0,      2:J=J 2
170 DRAW1 0,1:DRAW0,J
180 DRAW  , 0,1:DRAW0,  J,1
190 CURMOV 2,0,0
210 FOR=  TO3
220 CURMOV  16,0,0:DRAW0,J 1
240 CURMOV16,0,0:DRAW0,  J 1
```

```
 A  ME 1
 5  [illegible]
 7A   [illegible]
      [illegible]
 5  ME 1
      MB  F   O F NISH
      I= 0,1 V      GO SUB[illegible]
   0 MB=      TO  A=0,1
   5  A=  1=6    GOSUB4000
  26 MB=  1   0   2
   7  S   A,1=1+5  GOSUB4000
  28 MB=  TO TO 0
 1,0 I= 40,Y=0:  GOSUB4000
 150 MB=    CHARACTER
      B= 0   F       GOSUB4000
   5  40   USE  THE  I  IN ORDER TO MOVE ASTER SK
   5  I F 1,1= 0 THEN[illegible]
  40  F  N F  =6
 150  [illegible] 1  Y  F
  60  D=ABS( 0-1
      GET A$
  70  IF A$=  F THEN Y  =Y-1   16  IF Y<0   0  =  : GOSUB[illegible]:NOTE[illegible]
  77  IF A$=  D THEN Y  =Y+1   16  IF Y>9   9  =9:GOSUB2900:GOTO 50
  78  IF A$="D" HEN 240
 179  IF A$=  F  THEN 900
 180  I  ASC(A$)
 190  CHAR  F 0,0
 195  CHAR=1Y  1  10    6,  Y 09    9:    1
 4,0  I=I+    =B)    I  9   1  6
 450  I=I+(1  I  6     1   6   1+6
 480  Y=Y      =1  )    =1    319
 490  I=I+   F  16     (F  58   1  9
 500  GO  0 450
1000  I(,)1
```

```
 0 0 PR NCHR$(10-CHR$ 17); CHARACTER ASSIGNMENT";
 0 0 TXTME     F1=
 0     F   IF B1="HENA$=     AND  A=ASSION ";PE=4
 0 2 TF    16"B$AND1 T 7&0"THEN##    "2& VERS(ON)";PE=A
 0     F   T "&BITHENA$=    48P VERSION)  PE=0
 0 A 0 PR"N AN
 0 5 PR NTLHR$ I
 0 7 PR NT    MA'CH CHARACTER SET WOULD YOUR
 0 8 PR N'    CHOSEN PAT'ERN BE A MEMBER OF
 0 9 IN'N     (   S ANDAND OR ALTERNATE
 1 0 PR"N CHR$ 1"
 1 0 INPU "   PLEASE INPUT S OR A";A$
 1 0   FA$    S ANDA$    A"THEN) PR
 1 0 PR NTLHR$     )
 1 2 PR N      MANA PER REPLACED IN HIRES"
 1 3 PR NT     RELEASE   OF TEXT   GRAB   MODE
 1 5 PR NTCHR$(1
 1 6   INPU     PLEASE  INPUT N ON T";B$
       F 0$   TH GND$     "HENI 0
 1 8 PR N' -R$ 1
   0 PR NT    WHAT IS THE NUMBER OF THE
 2 0 PR N      HARACTER TO BE REPLACED
 2   PR NT"   RIN      AND "
 2 3 PR NT"    IF A  ALP   TER  MA=1 1( "
 2 4 PR NTCHR$ 1
 2 5   0$ 1"   PLEASE INPUT NUMBER (0
 2 6  IFVAL (0      VAL(A$      NOW CHECK IN
 2 7  IFVA (0       AND16="  THEN1 0(0P Q(1)0
 2 8 CH VAL (0 1 - 1
 2 9 PR N  HR$       HR$( "T DATA FOR REPLACE NEW CHARACTER  ;CH"
 3 0 "HENP HR$        ---   -   -   ---------- -----"
 3 1 "0 NTCHR$(0    "
 3 2   B$= N' REN. =A
 3 3   READ  A" NUM) I )
 3 5 I="HENI0 NC   =NT"
 3 7 PR N   ; AN1 ADDRESS  =  ;I"
 3 8 A$="N M 1 ; FOR   I  THENA$= TEXT
 3 9 IN'N  END AUTHE -1     =  1  =F
       PR NTCHR$         N  A$  MODE
 4 5 PR N  =R$ I ;CHR$(2)
 4 6  =R     =RU
 4 7 GOSUB= NT
 4 8 PR NT    K   NUMBER ";I+  (;"NEW VALUE = "; V
 4 9 NEXTI  "
 5 0 PR NTLHR$ I "      PRESS ANY KEY TO CONT NUE
 5 1 IN  A$
 5 2 A" 0)"OR
 5 3 FOR = "RI
 5 5 V= XY    I = 5 1 A+ XY        "0  "
 5 6 V= XY A       0   (1X(5,   =15 B = XY 4 I =35 B$+ XT 5 I =35 B$+V
 5 7 CHR$(4)/    I   U
 5 8 FOR   THENNEXTJAN
 6 0 RET
```

```
 0 0 CURSET 40, 70, 0
 0 5 CHAR   , 0, 1
 0 6 CHARPA, 1, 1
 0 7 RET URN
 0 8 "F1=1(0);PRINT CHR$( 0 CHR$ 17)
 0 9 PR NT"DO YOU WANT TO RERUN (Y/N)
 0 0 GET A$  /A$= Y THENRUN
       CLS PRINT CHR$( 7 :CLEAR:END
 0 0 CURSET 1, 0
 0     FOR= TOLEN A$)
 0 0 CHARASC M ZA MA 1 )    0, 1
 0 0 CURMOVE, 0, 0
 0 0 NE I
 0 0 NE URN
 0 0 REM MEMORY MAP  INFORMATION
   0 0 ZA A=0  4    4
   0 1  DATA PA A,  1  70
   0 2 ZA A         4  76
 1 0 ZA A BY1   79 76
 1   DATA 25 8    252
 1 0 ZA A=144 , 7 48
```

AMSOFT

OPERATING AND CONTROL SYSTEMS FOR DISCERNING SPECTRUM AND ZX81 USERS

All Amsoft products are designed to help users to get the most out of their machines. No additional hardware is needed to run them, but they can be used to support other devices if needed

Am-ZX FILE is a system which allows you to use large cassette data files in BASIC programs. There is no limit to how much data you can store or retrieve. Gives tape facilities like a large machine. ZX81 version £4.00, Spectrum version £5.00

AM-ZXMON is the ultimate operating system. With it you can create, edit, run and checkpoint machine code programs, and can save, load and merge portions of programs to or from tape. You can build and use your own subroutine libraries. ZX81 version £6.00, Spectrum version £7.00

Under the control of **AM-ZXMON** you can run **AM-ZXEDIT**, the text editor which allows you to produce source tape files for input to the **AMAZON** assembler. An easy-to-use product with exceptional facilities including tape merging and renumbering, are ZX81 and Spectrum versions £4.00.

Am-AZON, a full two pass assembler which converts assembler source tapes created by **AM-ZXEDIT** into machine code tapes which can be loaded and run by **AM ZXMON**. All ZX80 op. codes are recognised. Symbols can be up to 5 characters and symbolic, hex, string, or decimal are permitted. ZX81 version £8.00. Spectrum version available end of March £9.00

AMERSHAM SOFTWARE LTD.
Long Roof, Hervines Road, Amersham, Bucks HP6 5HS
Tel. (024 03) 6231

Straighten out a mixed-up masterpiece

Puzzle your friends with Picslide, an updated version of the well-tried letterslide game, presented by Lenora and Nick Godwin

It looks like modern art, but there's an ordinary picture in there somewhere. The trouble is, the pieces have got mixed up — and the game is to unscramble them.

Our Picslide game, for the ZX81 plus 16K RAMpack, is an updated version of those letter slide games that most of us have played at one time or another. But instead of rearranging scrambled letters to make words, the player has to rearrange the segments of a picture. And since the design of the picture is up to you, you can change the image whenever you like to increase the game's variety.

When you run the program, the first thing you will see is a sixteen-square grid with a black square at top left and the rest of the squares white. In the middle of the grid is a flashing cursor. Using the cursor and keys 1 to 8, draw a picture on the grid. Try to ensure that the picture extends into every white square. Figure 1 shows how the drawing builds up.

a precaution against the dreaded Wobbly RAMpack Syndrome.

RUN the program and

When you have finished your masterpiece, press STOP and the cursor will disappear. From this point on, the program can be saved with the picture intact.

Now you go on to scramble the picture, as shown in Figure 2. The black square represents the space on the picture slide board, and to move any square into that space, press the appropriate cursor control key. When the display is thoroughly mixed up, challenge your friends to sort out the mess!

We have included a machine code loader to make the picture squares move smoothly. To use it, reserve 358 bytes at the beginning of RAM by typing 1 REM followed by 358 characters, as shown in Listing 1. Then type in the rest of Listing 1. It is wise to save the program at this stage, as carefully enter in the machine code data set from Listing 2, which should be read across, line by line. The value of the CHECKSUM must be 31553 on completion. Any other value means you have made a mistake somewhere, which must be tracked down and corrected. Errors can be corrected by direct POKE command: for example, POKE 16517, 254. We recommend that you SAVE the program again at this point.

Before entering the BASIC program in Listing 3, type in POKE 16419,2. If you don't, the program will automatically list from line 1 after every operation. Do not try to LIST line 1. Enter Listing 3, overwriting Listing 1 where necessary.

ZX81 PROGRAM

Listing 1

```
    1 REM 123456789012345678901234
56789012345678901234567890123456
57890123456789012345678901234567
89012345678901234567890123456789
01234567890123456789012345678901
23456789012345678901234567890123
45678901234567890123456789012345
67890123456789012345678901234567
89012345678901234567890123456789
01234567890123456789012345678901
23456789012345678901234567890123
45678901234567890123456789012345
67890123456789012345678901234567
89012345678
   10 LET T=0
   20 FOR X=16514 TO 16871
   30 INPUT A
   40 POKE X,A
   50 SCROLL
   60 PRINT X,TAB 8,PEEK X,TAB 31
,PEEK X
   70 LET T=T+PEEK X
   80 NEXT X
   90 SCROLL
  100 SCROLL
  110 PRINT "CHECKSUM ";T
```

Listing 2

```
118  118  5    255  0    16   253  201
6    1    201  42   255  18   5    19
201  43   42   255  255  93   64   5
43   1    16   253  62   5    245  62
7    43   16   252  61   32   242  205
54   54   205  132  64   6    193  35
16   16   252  241  61   32   223  190
1    1    41   1    237  66   34   230
201  201  42   230  65   1    132  6
3    93   64   1    33   0    9    62
245  245  62   5    1    5    0    237
176  176  62   128  18   6    252  61
32   32   6    168  27   43   16   252
241  241  61   32   221  1    5    0
34   34   230  65   201  42   230  65
64   43   229  193  11   10   254  118
200  62   5    245  62   5    245  1
5    0    237  184  62   128  18   6
38   19   35   16   252  241  61   32
237  205  132  64   6    164  27   43
16   252  241  61   32   221  6    9
43   16   253  34   230  65   201  42
12   64   35   229  14   5    62   131
5    200  35   193  16   252  17   145
0    25   43   32   241  225  229  14
5    229  62   133  17   33   0    6
28   25   119  16   252  225  17   5
0    25   13   32   238  225  62   135
119  229  17   170  0    25   62   129
14   4    17   5    0    6    4    119
25   16   252  17   145  0    25   13
32   239  225  17   34   0    25   34
230  65   62   128  14   5    6    5
119  35   16   252  17   28   0    25
13   32   243  201  53   70
CHECKSUM: 31553
POKE 16419,2
```

Listing 3

```
  2 GOTO 10
  3 UNPLOT A,B
  4 RETURN
 10 RAND USR 16769
 20 LET A=20
 30 LET B=A
 40 PLOT A,B
 50 UNPLOT A,B
 60 IF INKEY$="" THEN GOTO 40
 70 IF INKEY$=" STOP " THEN GOT
O 210
 80 LET X$=INKEY$
 90 GOSUB 3
100 LET A1=(X$="2" OR X$="3" OR
 X$="8")-(X$="1" OR X$="4" OR X$
="5")
110 LET B1=(X$="1" OR X$="2" OR
 X$="7")-(X$="3" OR X$="4" OR X$
="6")
120 LET A=A+A1
130 LET B=B+B1
140 IF A=1+INT ((A-1)/10)+1 TH
EN LET A=A+A1
150 LET A=A+2*((A<2)-(A>40))
160 IF B=10+INT ((B-2)/10)+2 TH
EN LET B=B+B1
170 LET B=B+2*((B<3)-(B>41))
180 IF X$="9" THEN POKE 16891,2
46
190 IF X$="U" THEN POKE 16891,2
52
200 GOTO 40
210 LET A=0
220 IF INKEY$="" THEN GOTO 220
230 IF INKEY$="S" THEN GOTO 330
240 LET B=CODE INKEY$-28
250 IF B=6 AND NOT A OR B=7 AND
A=3 THEN GOTO 220
260 LET A=A+(B=7)-(B=6)
270 IF B=5 THEN RAND USR 16544
280 IF B=6 THEN RAND USR 16532
290 IF B=7 THEN RAND USR 16588
300 IF B=8 THEN RAND USR 16710
310 GOTO 220
320 INPUT X$
330 IF X$>"" THEN SAVE X$
340 GOTO 220
```

Figure 1

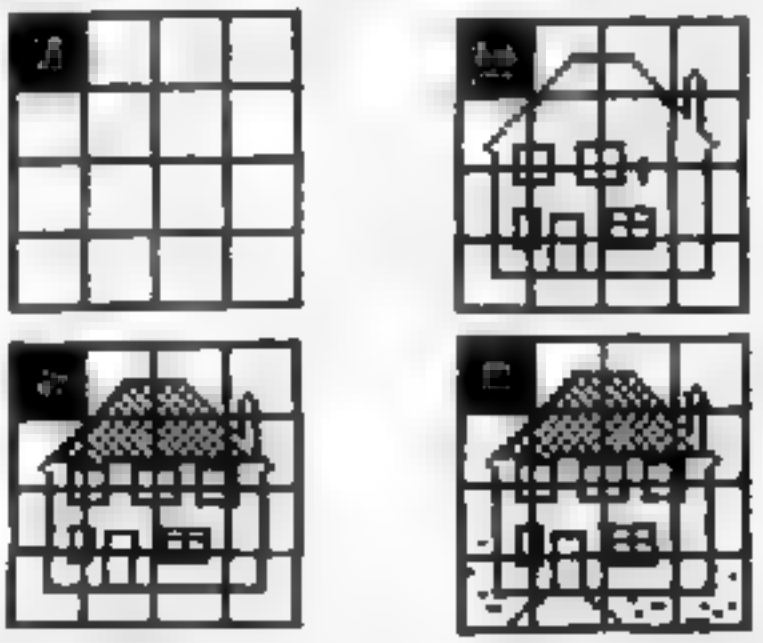
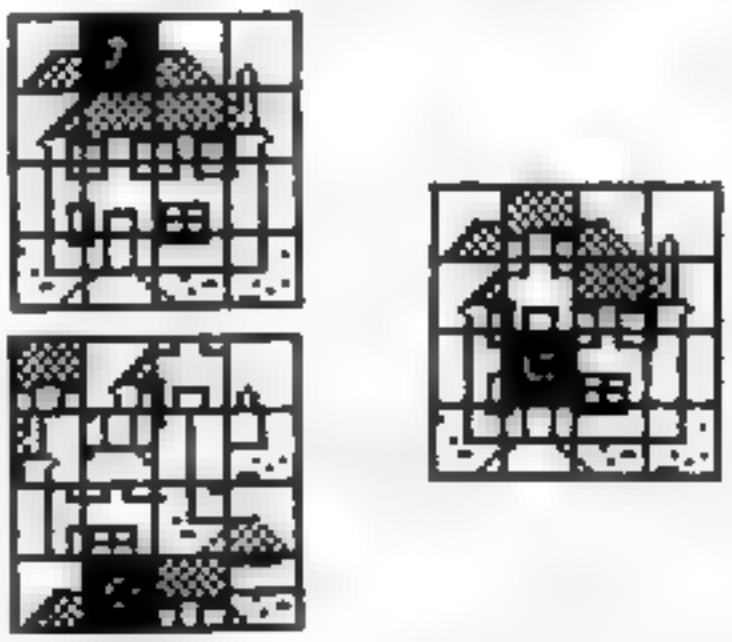


Figure 2



VIC-20 PROGRAM

Keep your head in an asteroid field

copyright Walt Disney

So you think you'd make a good space pilot? Glenn Fair challenges you to test your skill

They say troubles always come in pairs, and you've no reason to doubt it as you guide your craft through space.

Not only have you hit an asteroid field, but a fleet of alien ships is bearing down on you — and it doesn't look friendly.

Can you blast your way to safety by destroying the enemies, while weaving about to avoid a fatal crash with an asteroid? Test your skill as a space pilot with my program for the unexpanded VIC 20.

You are allowed three ships. Press the B key to fire — three cheers will boost your morale if you manage to shoot down an enemy ship. But if you crash, look out for fireworks.

Full instructions are given at the beginning of the program. Line by line, this is how it works.

Line 20 sets the volume to maximum and the screen and border colours to black and blue respectively.

Lines 30-75 set up the main variables, position the ship and start a blipping sound (this is one of the few space ships running on a two-stroke engine).

Lines 79-96 poke multi-coloured asteroids and enemy ships on to the screen in random positions, while lines 105 and 110 poke your ship and its "exhaust" on to the screen at position x.

Lines 120 and 125 control the movement of the ship, and line 130 checks to see if the fire button B has been pressed. Lines 135 and 140 ensure that the ship does not disappear off the edge of the screen.

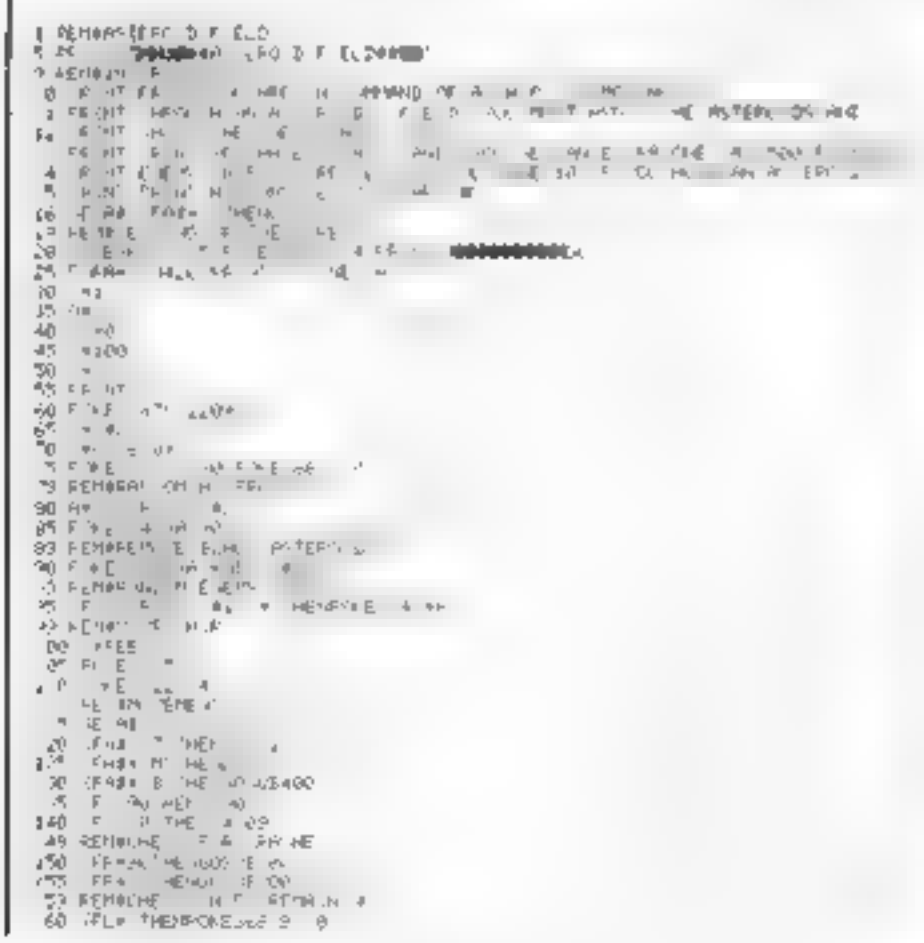
Lines 150 and 155 check to see if the ship has crashed into an asteroid or enemy ship. Line 160 changes the border colour (blue) to red to warn you that only one ship is remaining, while line 165 sends the program to its ending routine when the last ship is destroyed.

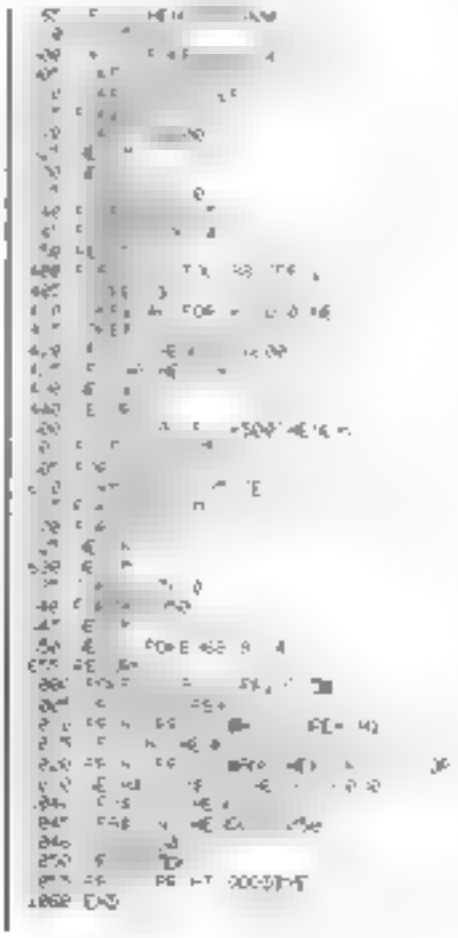
Subroutine 300 creates the explosion effect when the ship crashes, and deducts one ship from your original three.

Subroutine 400 controls the fire sequence when you press the B key. Line 420 checks to see if you have hit an enemy ship and line 425 checks whether you have hit an asteroid. If you hit an asteroid, ten points are taken off, to deter players from simply staying in one place and shooting everything out of the way.

Subroutine 600 is called by line 420 if you shoot an enemy ship. It changes the screen and border to white, and produces three "whoops", then adds ten points to your score and checks to see if you have reached 500 points. If you have, it adds an extra ship.

Line 1000 restores the screen to its normal colours, and prints out the score for the game along with the previous high score, which is retained until the program is ended. You can opt to continue to play if you wish.





Give your printer a right turn

Your ZX printout can be broader than it's long. David Nowotnik describes two programs to turn the printer's character set around and use it for word processing

For producing program listings and hard copies of the screen display, the ZX printer is fine But for more ambitious applications such as word processing or printing out large tables of results, the 32-character line width is a serious restriction

Do not despair, though — there is a way to increase the printer's line width to any size you like. Imagine that you could turn the printer on its side to convert character columns to rows and rows to columns Then you could have any character width you wanted, with a fixed number of 32 rows.

My Right Turn program, written for the 16K Spectrum, does just that. It is so called because the original characters are rotated through 90 degrees to lie on their right sides.

An example of output produced using this program is shown in Figure 1 If you want more than 32 rows, of course, several 32-row 'pages' have to be pieced together

To load the new character set to a higher RAM address in the 48K Spectrum, just substitute the values in square brackets for those appearing earlier in the line (line numbers 40, 50, and 270). The new character set is stored above a lowered RAMTOP, to allow it to be transfered from one program to another

Right Turn takes several minutes to run, as 768 decimal-to-binary-to-decimal conversions are carried out Once the program has finished, you can save the new character set on tape with the direct command SAVE "chars", CODE 31488,768 (48K version, 64512,768)

To keep you amused while the new character set is created the original and new characters are shown on the screen in an enlarged form Finally, a screen message appears which uses the new character set, to show you that it has worked

The new character set is brought into use by altering the value held by the system variable CHARS (line 270, see p173 of the handbook). CHARS is reset to its original value (line 390) before the program stops

The program could be modified to turn characters anti-clockwise, or upside down, by altering lines 170-210 Those changes that are necessary are shown in Listing 2

An example of the use of this new character set is the word processor program in Listing 3. First, use Right Turn to create the new character set starting at address 31488 (for both 16 and 48K Spectrums) After using NEW, type in the program in Listing 3

The program requires one user defined graphic (UDG) symbol. This is the " " in lines 3050 and 8010, and is used as an end of paragraph marker Type this is as "a" in graphic mode The UDG is created with the following direct commands.

```
POKE 23676,127
POKE USR"a",0
POKE USR"a"+1,16
POKE USR"a"+2,64
POKE USR"a"+3,127
POKE USR"a"+4,64
POKE USR"a"+5,16
POKE USR"a"+6,0
POKE USR"a"+7,0
```

Save the program first with the direct command: SAVE "word" LINE 10. Once saved, stop the tape, and enter the direct command to save the character set and UDG: SAVE "chars" CODE 31488,1120 Press Record on your tape recorder, and save the character set so that it follows immediately after the program on the tape. This allows the character set to be loaded automatically when the program is re-loaded

The printout in Figure 1 describes how the program is used. The program just fits a 16K Spectrum and is limited to one printed page only

If you have a 48K Spectrum, it is possible to expand the text file (b$) to hold several pages, although the output routine (line 3000-) will have to be modified to deal with more than one page. Figure 2 lists the main routines and variables used in the program

Figure 2 — summary of the main routines and variables used in the word processor

Routines

100-180	Initialise main variables
500-640	Main routine
530-540	Wait for a keypress
550-580	Check for a valid keypress (alphabetic, number, control or ENTER)
600-640	Print a character and enter in the text file; move cursor to next position, checking for end of text file, end of line, and end of display file
700-740	SCROLL (by overprinting)
750-780	Reverse SCROLL
1000-1050	Load a text file from tape
2000-2030	Save a text file
3000-3500	Print text file, the routine involves line justification, then placing strings of up to 64 characters into a$ for printing
4000-4040	Move cursor left
5000-5060	Move cursor down
6000-6070	Move cursor up
7000-7040	Move cursor right
8000-8070	End of paragraph marker, place on the screen, and move print position to the next line

Variables

■	Formatted text
b$	Unformatted text
cur	Cursor position in attribute file
c(8)	Command key CODE numbers
mk	Used in formatting, marks the position reached in a$
x y	Cursor co-ordinates on the screen

Figure 1

```
Once loaded into your Spectrum, the word processor program
starts automatically in text mode. The black-or-white cursor
indicates the position of the next character to be entered.
This can be any alphabetical, numeric, or punctuation
character, but not any obtained in graphics mode. Enter text as
you would using a typewriter but do not worry about words
overflowing from one line to the next, this will be corrected
on printout. Press ENTER to indicate the end of a paragraph.
   Certain numeric keys used with CAPS SHIFT have control
functions. They are
   1. LOAD  A text file previously saved on tape will be
```

```
re. loaded into the computer.
   4. SAVE the text file.
   5. OUTPUT  The text file is printed with the ZX printer using
a  64 column format.
   6. Cursor left.
   7. Cursor down.
   8. Cursor up.
   9. Cursor right.
   Use the cursor control keys to edit the text.
   Printer output is slow due to the formatting routine, which
is in BASIC.
```

Listing 1 — Right Turn

```
  10 REM     Right turn
  20 REM © D.P. Nowotnik, 1982
  30 REM
  40 CLEAR 31487: REM [64511]
  50 LET x=15616  LET y=31488  R
EM [y=64512]
 100 FOR k=1 TO 96: DIM c$(8,8)
 110 FOR j=1 TO 8: LET d=PEEK x
 120 FOR i=8 TO 1 STEP -1
 130 IF d/2<>INT (d/2) THEN LET
c$(j,i)="■"
 140 LET d=INT (d/2): NEXT i
 150 LET x=x+1  NEXT j
 160 DIM d$(8,8)
 170 FOR i=1 TO 8  LET d=0
 180 FOR j=0 TO 7
 190 IF c$(8-j,i)="■" THEN LET d
=d+2↑(7-j)  LET d$(i,j+1)="■"
 200 NEXT j  POKE y,d  LET y=y+1
 210 NEXT i
 220 CLS  PRINT x; PRINT "[redacted]
[redacted]";"[redacted]"
 230 FOR n=1 TO 8
 240 PRINT "■";c$(n);"■";"■";d$(
n);"■"  NEXT n
 250 PRINT "[redacted]";"[redacted]
[redacted]"
 260 NEXT k
 270 POKE 23607,122  REM [251]
 280 CLS
 290 LET i=30
 300 LET a$="That's it!": GO SUB
 500
 310 LET a$="Remember - the numb
ers"
 320 GO SUB 500
 330 LET a$="in square brackets"
: GO SUB 500
 340 LET a$="in the program list
ing"  GO SUB 500
 350 LET a$="are to be used with
a"  GO SUB 500
 360 LET a$="48K Spectrum", GO S
UB 500
 390 POKE 23607,60
 400 STOP
 500 LET x=1  LET a=11-LEN a$/2
 510 FOR j=a TO a+LEN a$-1
 520 PRINT AT j,i,a$(x)
 530 LET x=x+1  NEXT j
 540 LET i=i-2  RETURN
```

Listing 2 — modifications to convert right turn to left turn and inverted character sets

Left Turn

```
170 FOR j=1 TO 8  LET d=0
180 FOR i=0 TO 7
190 IF c$(j+1,8-i)="■" THEN LET
d=d+2↑(7-j)  LET d$(i,j+1)="■"
200 NEXT j  POKE y,d  LET y=y+1
210 NEXT i
```

Upside-down

```
170 FOR j=1 TO 8: LET d=0
180 FOR i=0 TO 7
190 IF c$(8-j,i+1)="■" THEN LET
d=d+2↑i  LET c$(j,8-i)="■"
200 NEXT j  POKE y,d: LET y=y+1
210 NEXT j
```

Listing 3 — word processing program

```
  10 REM Word Processor
  20 REM by D.P. Nowotnik
  30 REM December, 1982
  40 REM
  50 REM Initialise
  60 REM
  70 CLEAR 31487  POKE 23670,127
  80 PRINT AT 0,0  Flash 1  Plea
se Wait
  90 LOAD ""CODE : CLS
 100 DIM c(6): REM command keys
 110 FOR i=1 TO 6. READ c(i): NE
XT i
 120 DATA 7,6,4,8,10,11,9,13
 130 INPUT a$;"L",USR(a$+40),
 150 LET t=1  REM top row numbe
r
 170 LET x=0  LET y=0  LET cur 2
5526  REM Cursor position
 180 LET tc=0  REM Cursor positi
on in text file
 500 REM Main routine
 510 PRINT #0 AT 0,4;"[redacted]
[redacted]"
 530 POKE cur
 540 IF INKEY$="" THEN GO TO 540
 550 LET z$=INKEY$  LET z=CODE z
$  BEEP .02,0  IF z>31 THEN GO T
O 580
 560 FOR i=1 TO 6  IF z=c(i) THE
N GO TO (i*1000)
 570 NEXT i: GO TO 530
 580 IF z>164 OR tc>2048 THEN GO
 TO 530
 600 LET b$(tc)=z$: LET tc=tc+1
 610 PRINT AT y,x,z$;  LET x=x+1
  IF x>31 THEN LET x=0  LET y=y+
1
 620 LET cur=cur+1: IF cur<25232
 THEN GO TO 520
 630 LET cur=cur-32: LET y=y-1
 640 GO SUB 700: GO TO 500
 700 REM Scroll
 720 LET t=t+32
 730 PRINT AT 0,0,b$(t TO t+703
)
 740 RETURN
 750 REM Rev Scroll
 760 LET t=t-32
 770 PRINT AT 0,0,b$(t TO t+703
)
 780 RETURN
1000 REM Load
1020 INPUT "[redacted] - Enter file na
me";n$
1030 LOAD n$ DATA b$()
1040 PRINT AT 0,0,b$( TO 704)
[illegible]
2000 REM [illegible]
```

```
3000 PRINT #1 AT 0,4
3010 PRINT #1 AT 0,4
3020 FOR k=1 TO 64
3030 IF b$(k)="." THEN GO TO 3140
3090 NEXT k
3100 FOR k=64 TO 2 STEP -1
3110 LET b$(k)=b$(k-1)
3120 LET b$(1)=b$(64)
3130 LET a=a+1+2*INT (a/8)
3150 LET b$(k)=b$(k-1)
4000 FOR k=1 TO 64
4010 IF b$(k)="." THEN GO TO 4030
5000 REM Cursor up
5010 LET tc=tc-32
5020 IF tc<2048 THEN LET tc=tc+32
5030 POKE cur,56
5040 LET y=y-1
5050 LET cur=cur+32
5060 LET y=y-1
6000 REM Cursor up
6010 LET tc=tc-32
6020 IF tc<1 THEN LET tc=tc+32
6030 POKE cur,56
6040 LET y=y-1
6050 LET cur=cur-32
6060 LET y=y+1
7000 REM Cursor right
7010 IF cur=2047 THEN GO TO 520
7020 POKE cur,56
7030 LET x=x+1
7040 LET tc=tc+1
8000 REM Enter
8010 PRINT AT y,x,"←"
8020 LET x=x+1
8030 FOR i=x TO 31
8040 LET tc=tc+1
8050 IF y<=2 THEN GO TO 520
8060 GO SUB 700
8070 LET y=21
```


ZX81 16K | SPECTRUM 16/48 | DRAGON 32 | TANDY LEVEL 2 | BBC A/B

AWARI

★ The ancient African game of logic. It takes 2 minutes to learn the rules but far longer to master the tactics

★ Select the 'Goat-herd' level of play and it's an addictive game for children (8+) that exercises their minds – not their laser fingers

★ Select the 'Witch-doctor' level and it's a threat to your sanity. We haven't beaten it and we wrote it!

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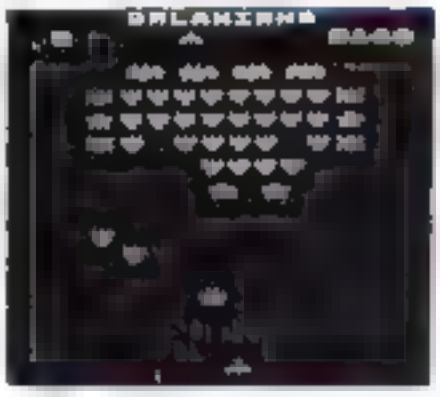


Colorwars
32K BBC
£8.50

Superior Software, 69 Leeds Road, Bramhope, Leeds

Colorwars is another of the old favourites, and while this is not a full implementation of the arcade game, nor are any of the others that I have seen. Sadly, none of them have the circling aliens that swoop down in your formation.

However, the aliens in this game do move about quite a lot and show fiendish intelligence in avoiding your lasers. Just when you think you are safe from one it reverses direction and crashes straight into you — very frustrating.

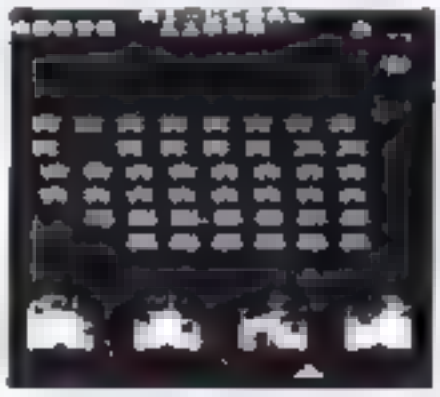
There are six skill levels — the sixth requiring more skill and dexterity than I have at the moment. The levels are well chosen and should last most players quite some time. A high score table is also included.

The program loaded first time and contains good instructions. The graphics are well presented and smooth, even when the action gets frantic.

My only complaint is about the sound, which is very exciting at first but begins to grate after a while. This is a common fault that applies to most games and not just Superior Software so how about an option to cut out the sound or at least reduce it you software writers? **D.C.**

instructions	80%
playability	80%
graphics	80%
value for money	70%

★ ★ ★



Invaders
32K BBC
£8.05

Superior Software, 69 Leeds Road, Bramhope, Leeds

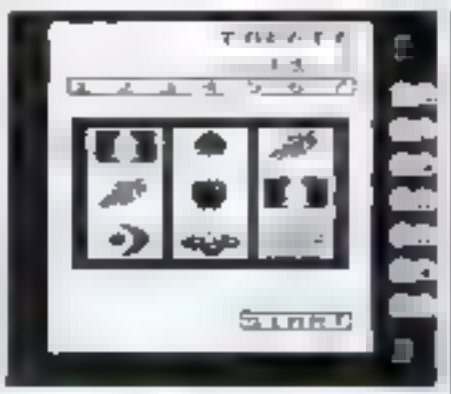
Being asked to write a review about Space Invaders is like being asked to write an original review of the Bible — it can't be done. Everything there is to say about it has been said, but anyway, here goes.

The program loaded first time, and the instructions are quite adequate, even though this must be the only game that would be usable without instructions. The usual features of different values for the invaders and random mother ships are included, but there is no optional skill level.

As the invaders near the bases, they speed up, and get very fast near the end. I liked the way the shields cracked and crumbled instead of a slice just disappearing. A high score table for the top ten is provided and you can get back to the title page by pressing ESCAPE. **D.C.**

instructions	80%
playability	80%
graphics	75%
value for money	65%

★ ★ ★



Fruit Machine
32K BBC
£8.05

Superior Software, 69 Leeds Road, Bramhope, Leeds

Fruit Machine is the only non-arcade-type game from Superior Software. It is also the only program in their catalogue that I would not personally recommend. It isn't that it is a bad program, indeed, the graphics are excellent, but I just cannot see the point in sitting in front of a screen playing a one-armed bandit. Where's the fun in it without a slot for the winnings to fall out of?

However, the program itself is well written and well presented, only lacking in prompts to remind you of the winning combinations. All the features that you would expect are there: hold, nudge, gamble, collect and so on. **D.C.**

instructions	55%
playability	40%
graphics	70%
value for money	30%

★

Centipede
32K BBC
£8.05

Superior Software, 69 Leeds Road, Bramhope, Leeds

This program, like most of Superior's products, loads in two sections, the first being a short program to identify the suppliers and the second part loading automatically. This program loaded first time every time without any problems. The instructions displayed after loading are clear and concise but do not include tips. The keys used are Z, X and COPY, and are sensibly chosen.

The aim of the game is stop the centipede reaching the bottom of the screen and eating you. You score 50 points for destroying a section of the body and 100 for a head. To reach a high score, the best tactic is to break the centipede into as many sections as possible, all consisting of just a head worth 100 points.

All the expected items are there including snails, flies and spiders, which gain you points and mushrooms which act as shields for the centipede. Centipedes appear in blue, green and red with increasing difficulty.

Six skill levels and a high score table for the top five are provided. The screen display is well laid out and smooth in action and the game varies in its start up position and paths taken. **D.C.**

Instructions	70%
playability	80%
graphics	70%
value for money	80%

★ ★ ★ ★

Firien Wood
32K BBC
£7.50

MP Software & Services, 165 Spital Road, Bromborough, Merseyside L62 2AE

You either love adventure games or you loathe them. I love them and this one is a beauty which should appeal to novice and experienced adventurer alike. Your task is to track down the Golden Bird of Paradise which has been captured by an evil wizard lurking somewhere in the heart of Firien Wood.

The game starts by giving a brief description of your surroundings, and then waits for you to type in instructions to determine what it should do next. Instructions are either a direction (eg "NORTH", meaning go north) or a verb followed by a noun (eg ENTER BUILDING). If you are lucky the computer responds with some new information, if you are unlucky it responds with "I don't understand" and you must try something else.

Firien Wood features the usual gamut of fiendish puzzles, magic passwords, knife-throwing goblins, quirky humour, and all manner of treasures and monsters to be dealt with en route. You can also save a game to tape, ready to be resumed at a later date.

The game is written entirely in machine code which makes for some very fast responses (and also stops you from cheating!) but means the program has to be *RUN rather than CHAINed into the micro.

Although there are no graphics in the game (what do you expect in 32k?) good use is made of colour — non-committal messages usually appear in purple, warning messages in red (severe warning messages in flashing red), useful information in green, magic messages in yellow etc.

It's impossible to fully check an adventure program in a few days, but an initial examination reveals a large number of locations and puzzles to keep an adventurer happy for weeks.

Nice one MP Software! **I.D.S.**

instructions	60%
playability	67%
graphics	0%
value for money	83%

Space Fighter
32K BBC
£8.05

Superior Software, 69 Leeds Road, Bramhope, Leeds

This program is a cross between Defender and Scramble with features of both games used to good effect. There are five (yes, FIVE) types of alien to destroy: Mutant (50 points), Swarmer (100), Trimort (150), Baiter (150) and Baryon (150).

The Trimort is particularly nasty and has to be hit three times before it is destroyed. Mutants and Trimorts move randomly, Swarmers move away whilst Baiters and Baryons will try to ram your ship. Asteroids also appear on the screen and will blow you up if you hit them.

An unlimited supply of lasers are at your disposal but you have only three smart (ie homing) bombs needed to destroy the Baryons and Asteroids. A smart bomb will destroy everything on the screen so it is good strategy to use them when lots of Asteroids and Baryons are present. You are governed in your quest by the amount of fuel you have, but do not despair, you can replenish your fuel tanks by destroying a fuel dump.

The program loaded first time and the control keys are well chosen. Six skill levels are available and the instructions state that bonus ships are provided after 10,000 and 20,000 points, but I will have to take this on trust as I could not score above 7,000! A thoroughly enjoyable program, well worth the money — pity that the graphics used for the space ship are not as good as the rest. **D.K.**

instructions	80%
playability	85%
graphics	80%
value for money	90%

Spaceguard
32K BBC
£7.50

MP Software & Services, 165 Spital Road, Bromborough, Merseyside L62 2EA.

A fairly simple, but quite addictive arcade game this one! As the "space guard" of the game's title you control a spaceship under attack from various alien vessels determined to turn the screen into a mine field.

Points are scored by firing a laser at the alien vessels (150 points) or the mines they have deposited (50 points), with a bonus 1000 points being awarded for each screen cleared.

Initially, the emphasis is on "space" rather than "guard", screen presentation being a little unimaginative and consisting of a large black space occupied by your ship and a few alien vessels. But with successive screens, more and more alien spacecraft appear, making the game increasingly difficult.

There are three different types of alien vessel, resembling a traditional green space invader, a blue dumb-bell (this splits into two flashing "liquorice allsorts" when hit) and a pair of red lips!

Movement of the player's space ship is by keyboard or joystick. I didn't like using the keyboard because of the close grouping of the keys used to move the ship, but control by joystick was superb and the best I've encountered in any joystick game for the BBC machine.

The graphics are perhaps a little crude (Mode 2 is used for the screen display) but this is more than compensated by the speed of the machine code program and the good use of sound effects. **I.D.S.**

instructions	[illegible]
playability	
joystick	70%
keyboard	52%
graphics	[illegible]
value for money	68%

Swamp Monsters
32K BBC
£7.50

MP Software & Services, 165 Spital Road, Bromborough, Merseyside L62 2AE

Swamp Monsters is MP Software's variation on the classic Space Panic arcade game. Pursued by alien monsters (which bear a marked resemblance to Zebedee from "The Magic Roundabout") you control the movement of a robot around a maze of stepping stones set in a deadly swamp.

As your robot moves he can pick up stones, to leave "holes" for the monsters to fall into. Stones can then be dropped on a drowning monster to speed up his demise, or to help form a new path across the swamp.

On starting the game you have the option of using a joystick or the cursor movement keys on the keyboard to control the robot. Unfortunately you cannot switch between the two options without reloading the whole game. Movement of the robot and pursuing monsters is slow and jerky so that use of the joystick is not really viable, whilst the cursor keys are grouped very closely together making control of the robot from the keyboard more difficult than it should be.

The graphics are quite good, although the robot — a sort of pink paper bag with stick insect arms and legs — looks ridiculous, and I often found it difficult to tell exactly which stone he was standing on.

Once the swamp has been cleared of monsters a fresh lot appear — apparently more intelligent and worth more points if you're watching your robot's score. I say "apparently" because I didn't progress so far as to meet them — I became bored with the game long before I'd cleared the second swamp of monsters. **I.D.S.**

instructions	60%
playability	40%
graphics	60%
value for money	42%

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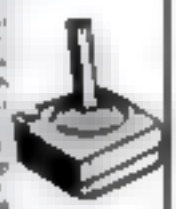

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